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Summer Sessions

1962

UNIVERSITY OF MASSACHUSETTS

UNIVERSITY OF MASSACHUSETTS BULLETIN

The University of Massachusetts is the Land-Grant University of the Commonwealth, its primary purpose being to serve the people and the interests of the State and the Nation.

Summer Session Highlights

Program For Students Graduating From High School in June, 1962

Concentrated Teacher Training Program
For Liberal Arts and Science Graduates

Job Related Courses and Work Conferences
For Professional Graduate Nurses

Workshops and Seminars in Education

Courses in Engineering, Forestry, Home Economics, and Nursing

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CALENDAR FOR THE TWO SUMMER TERMS

TERM	REGISTRATION DATE	PAGE	TIME	CLASSES BEGIN	CLASSES END
1st	June 25	Student Union Bldg.	8 a.m. to 12 noon	1 p.m.* June 25	1 p.m. July 26
2nd	July 30	Student Union Bldg.	8 a.m. to 12 noon	1 p.m.* July 30	1 p.m. Aug. 31

Wednesday, July 4, Independence Day. No exercises. Classes will be held on July 7.

Classes are also scheduled August 4, during the second main summer term.

*On June 25 and July 30, classes scheduled for the 1st morning period will meet from 1-1:50 p.m., 2nd morning period will meet from 2-2:50 p.m., 3rd morning period will meet from 3-3:50 p.m., afternoon period will meet from 4-4:50 p.m.

Registration for other summer courses at Registrar's Office, South College, on the first day of the session.

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General Information

The University of Massachusetts is the state university of the Commonwealth, founded in 1863 under provisions of the Morrill Land Grant Act passed by the United States Congress one year earlier.

Presently preparing for the observance of its Centennial, the University is a member of the great community of Land Grant colleges and state universities serving the nation as principal resources of higher education for the country's citizenry. Incorporated as the Massachusetts Agricultural College in April, 1863, the institution was formally opened to a handful of students in 1867. Rooted in the liberal arts tradition (its early presidents were graduates of such colleges as Dartmouth, Williams, Amherst, and Harvard), it has grown steadily from the four teachers and four wooden structures available for its opening session. Reflecting the broadening interests of its students, the General Court of Massachusetts authorized a second name, Massachusetts State College, in April, 1931. Sixteen years later, in May, 1947, the institution became the University of Massachusetts.

Situated in one of the most picturesque sections of the state, the University joins with its academic neighbors—Amherst, Smith, and Mount Holyoke Colleges—in maintaining the rich tradition of educational and cultural activity associated with this Connecticut Valley region. The University's central campus consists of approximately 700 acres of land and 80 buildings. Physical growth has been carefully planned, with provisions for additional buildings and facilities to accommodate an enrollment of approximately 10,000 students within the next decade. Offering a comprehensive program of instruction and research, the University is thus the Commonwealth's major resource of public higher education dedicated to the preservation and continued development of the country's free institutions.

THE UNIVERSITY RESERVES, FOR ITSELF AND ITS DEPARTMENTS, THE RIGHT TO WITHDRAW OR CHANGE THE ANNOUNCEMENTS MADE IN THIS CATALOGUE.

UNIVERSITY OF MASSACHUSETTS
SUMMER SESSIONS
1962

FIRST SUMMER TERM.....JUNE 25—JULY 28
SECOND SUMMER TERM.....JULY 30—AUGUST 31
SPECIAL COURSES.....JUNE 4—SEPTEMBER 7

PROGRAMS OFFERED

Entering Freshmen

The University of Massachusetts is inviting well-qualified high school graduates to begin their college education immediately after June 1961 graduation. In view of the rising enrollment pressures on University facilities, the University believes that for certain students, a summer program of studies might be helpful. For the good student who, perhaps, is already convinced his formal education will require graduate and professional studies after his undergraduate work, an early start may save him valuable time.

The full facilities of the University of Massachusetts—its professional teaching staff, classrooms, libraries, laboratories, dining rooms and dormitories—will be available this summer for two summer terms from June 25 to July 28 and from July 30 through August 31.

June graduates of high schools, certified for college work, may begin required freshman courses including those in English, languages, natural and social sciences. This program should be especially attractive to young men who face military commitments, those interested in eventually entering graduate school, and others who wish to complete their college work in less than four years.

Special Certification Program for Teachers

The School of Education is continuing its program of preparation for teacher certification for undergraduates and graduates of colleges of liberal arts and science who wish to teach in either elementary or secondary schools and who find it difficult to take courses during the regular university year. The program includes four professional courses during the summer session and student teaching in public schools during the fall. In certain cases in emergency fields such as elementary education, foreign languages, mathematics, and sciences it may be possible to arrange a year's internship with full pay in a public school in place of student teaching. This program meets certification requirements in Massachusetts and several other states and admits to temporary certification in several others. The program is well suited to married women who can be away from home during the day in July and August, as frequently the student teaching can be done in the student's home town.

For a detailed description of the various Certification Programs and for application materials the candidate should write to the Dean, School of Education, Machmer Hall, University of Massachusetts, Amherst. To insure accurate appraisal of the application the materials should be completed and returned as far in advance of June 2, 1962 as possible. In case of over-enrollment the ap-

plicants will be chosen in the order of their application and acceptance. Applicants for the full program of courses and student teaching will have priority in the courses. A few student places in the certification courses may remain for other qualified students who wish to take one or more courses for professional improvement or to complete certification requirements.

Special attention is drawn to the Workshop offering for experienced teachers. The Workshop in Preparation of Secondary School Teaching Units will enable the teacher to keep abreast of new curriculum developments and materials, and the Workshops in Remedial and Individualized Instruction will involve working with elementary pupils in the School of Education's new Laboratory School.

The School of Education is offering also its usual broad program of graduate courses for teachers, administrators, and other school personnel leading toward a graduate degree or for professional improvement. Application for these courses should be made by completing the graduate form at the back of this bulletin and sending it to the Graduate Office.

Special courses in Engineering (Chemical, Civil, Electrical and Mechanical) Forestry, Home Economics, and Nursing will also be offered.

Credit for Summer Work

All courses carry degree credit and are equivalent in method, content, and credit to courses offered in the University during the regular academic year. Credits obtained in these courses are ordinarily accepted as transfer credits by other colleges and universities. Students desiring to pursue courses for the advanced degrees must seek the approval of the Dean of the Graduate School.

Thesis and Special Problems Credit

Graduate students contemplating special problems course work and thesis work during the summer session should seek the permission of their Department Heads and/or advisers and get approval from the Dean of the Graduate School. Such programs, although not listed by title and number in the summer session bulletin, are available by many departments on campus during the summer session.

Study Load

Students attending either summer term usually carry two courses, enabling them to earn six or seven semester hours credit. University of Massachusetts undergraduates will receive permission to take more than two courses only if their scholastic average has been 3.0 quality point or better for the last two semesters. A student from another college can enroll for more than two courses only if the appropriate official of his own college submits a statement recommending such a program and certifying that he is an honor student at that institution.

Expenses (For each five-week summer term)

Tuition for residents of Massachusetts	$10.00 per credit hour
Tuition for non-residents of Massachusetts	15.00 per credit hour
Student Recreation Fee	1.00
Student Health Fee	5.00
Student Union Fee	5.00
Room Rent	32.00
Board (5-day meal ticket)	51.00

Books, stationery and supply expenses:

Students should be financially prepared to pay for necessary books and incidental supplies. Certain departments also make special charges for necessary laboratory supplies.

Special Examinations:

Students receiving credit by special examination must pay $5.00 per credit before the examination may be taken.

Advance Enrollment (Undergraduate and Graduate Students)

To expedite advance enrollment, or to obtain approval of admission, undergraduate students contemplating attendance should notify the Registrar as soon as possible, using the application form on page 32 of this bulletin. Graduate students must use the application form on page 34 of this bulletin. Graduate students must receive approval for admission from the Dean of the Graduate School. Payment of fees and other costs prior to the registration date is strongly advised to insure enrollment in certain courses offered.

Residents

New students who are residents of Massachusetts must file certificate of residence with the Treasurer's Office in order to obtain the residential tuition rate (see page 33 of bulletin for form to be filled out).

Housing and Board

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in University dormitories and board at the University Commons unless commuting from the home of parents or spouse.

Dormitories will be open for occupancy at 2:00 p.m. on the day immediately preceding registration day of each summer term and will close on the day following the close of examinations. Room assignments will be available from the Head of Residence of each dormitory on arrival. Dwight House will be the residence for women; Hills House for men.

Most rooms are double and are provided with basic furniture, including mattress. Each student is responsible for providing study lamp, metal wastebasket, ash tray if desired, also pillow, blankets, bed linen, and towels, either supplying them personally or subscribing to a linen service, available locally.

Married students may write to the University Housing Office regarding accommodations.

Meal tickets for dormitory residents provide board at the University Dining Commons on a five-day basis (Monday through Friday). Cafeteria service is available in the Coffee Shop of the Student Union on weekends and during the summer for other students desiring food service.

Veterans

Veterans who plan to enroll under the G. I. Bill (P. L. 550) should present—not later than the time of registration—evidence of eligibility or make application for training at that time. Students already enrolled under P. L. 550 should re-enroll for Summer Session work. Under this law, veterans receive an education and training allowance from the Veterans Administration from which they pay their own university fees and purchase their own books and supplies. Students should see Mr. George Emery, South College, for further information on this program.

SERVICES AND RECREATION

During Summer Session the facilities of the University are at the disposal of students. In addition to the classrooms, the laboratories, and library facilities available for student use, a number of other agencies and services are offered.

University Health Service

Medical consultation and treatment is available to students at the University infirmary. The infirmary, located west of the Dining Commons, furnishes ordinary medical care for students.

Placement Service Loans

Three types of loans are available to students—University short term loans, Massachusetts Higher Education Loans, and National Defense Student Loans. Students should see Mr. Robert Morrissey, Director of Placement, Machmer Hall, for information on these programs.

Part-Time Student Employment

Campus part-time jobs are available for a limited number of students. Students seeking employment should see Mr. David Lawrence, Placement Officer for Men, and Miss Carole Leland, Placement Officer for Women. Their offices are located in Machmer Hall.

Recreation and Entertainment

In planning for its students, the importance of recreation, entertainment, and relaxation are recognized. The natural environment in which the University is located affords almost unlimited facilities for combining recreation activities with academic and professional achievement. Indoor and outdoor extracurricular activities designed to meet varying interests of individuals are planned. Such features as band concerts, movies, and square dances will be scheduled. In addition, programs for recreation offering many informal sports such as swimming, softball, baseball, tennis and hiking will be arranged. Special lectures, a trip to the Berkshire Music Festival at Tanglewood and a play at Mountain Park will also be provided. A get-acquainted picnic will be scheduled during each summer term. A golf course, located within five minutes driving time from the University campus, is available to students upon payment of green fees.

The Student Union Building, a center of student activity and social life, serves as a recreational center and common meeting place for students. Attractively furnished, the Union includes lounges, music listening rooms, reading rooms, game and recreation rooms, bowling alleys, ballroom, and a coffee shop.

A Student Activities Office and staff in the Student Union plan and execute the social and recreational programs.

COURSE DIRECTORY

Courses numbered 1-99 carry undergraduate credit only. Those numbered 100-149 and 200 or over admit graduate students only. Courses numbered 150-199 are undergraduate courses for which graduate students may receive graduate credit with the completion of additional requirements as determined by the instructor. The numbers in parentheses indicate credit value of the courses.

The timetable of summer classes, listing the times and places of class meetings and names of instructors for the two summer terms, begins on page 27 of this bulletin.

FIRST SUMMER TERM
(JUNE 25—JULY 28)

AGRICULTURAL ENGINEERING 276. Advanced Agricultural Machinery Design (3). Stress analysis, periodic vibration, and shock loadings, as related to design of agricultural machinery. The mathematical definition of tillage tool surfaces. Dynamics of suspension devices, automatic release equipment, and hydraulic systems. Prerequisite, Agricultural Engineering 176.

ART 33. Basic Drawing (3). Introduction to drawing in black and white, applying pencil, crayon, charcoal techniques to representation in line and tone, emphasizing sound observation and effective presentation.

ART 57. Printmaking (3). Basic study of materials, techniques, aesthetic considerations peculiar to graphic media of lithography and intaglio. Prerequisites, Art 31 (Basic Design), Art 34, or permission of the instructor.

ART 58. Printmaking. Continuation of Art 57.

BACTERIOLOGY 31. Introductory Bacteriology (4). An introduction to the bacteria and sub-microscopic organisms, their place in the general field of biology, and their importance in world industry, economics and health.

BOTANY 1. Introductory Botany (3). The morphology and physiology of plants.

Business Administration

ACCOUNTING 25. Introduction to Accounting (3). An introduction to the principles underlying the collection, recording, and interpretation of accounting data.

ACCOUNTING 73, 173. Federal Income Tax Procedures (3). A study of federal income tax laws and regulations as they affect individuals; the preparation of tax returns. Prerequisite, Accounting 26.

FINANCE 65. Corporation Finance (3). Social significance of corporate financial behavior. Internal administration and control. Expansion, capital-readjustment, and social control. Prerequisite, Accounting 25, or consent of instructor.

GENERAL BUSINESS 71. Business Law I (3). The law of contracts and sales.

MARKETING 53. Marketing Principles (3). A survey of the problems involved in the distribution of industrial and consumer goods including wholesaling, retailing, and sales promotional activities.

MARKETING 54. Salesmanship and Sales Management (3). The principles and practices of selling; the management of sales personnel and the control of sales operations.

MARKETING 71. (I) Retail Merchandising (3). The principles of retailing with case studies of retail management problems. 3 class hours.

CHEMISTRY 1. General Chemistry (3). A study of the fundamental chemical laws and theories, with the object of giving the student a sound scientific training through a course in chemistry.

CHEMISTRY 29. Qualitative Analysis (4). Systematic semi-micro analysis in a study of the principles and laws of the behavior of solutions of electrolytes. Prerequisites, Chemistry 2 or 4 (or equivalent).

CHEMISTRY 51, 151. Organic Chemistry (4). A survey of the properties, preparation and reactions of the important classes of aliphatic and aromatic compounds. Prerequisite, a course in qualitative or quantitative analysis.

CHEMISTRY 65, 165. Physical Chemistry (3). A study of the fundamental theories and laws of physical chemistry, together with the solution of problems involved in their application. Prerequisites, Chemistry 32 or 27 (Quantitative Analysis); Mathematics 30; Physics 26.

ECONOMICS 25. Elements of Economics (3). Definitions and introductory principles of production, exchange, and the financial organization of society, with a short survey of the economics of distribution and the use of wealth and income.

ECONOMICS 53, 153. Money, Banking and Credit (3). The development and operation of the monetary and banking systems of the United States; problems of achieving full employment and price stability through monetary controls. Prerequisite, Economics 25.

ECONOMICS 70, 170. The Structure of American Industry (3). Business enterprise, market competition, and economic development in American industries. The social effectiveness of industries analyzed through measures of industrial structure and market performance. Prerequisite, Economics 25.

EDUCATION 51, 151. History of Education (3). Educational movements are traced from early Greece to the present with the aim of better understanding of modern problems.

EDUCATION 53, 153. Educational Tests and Measurements (3). The most serviceable tests for measuring achievement are considered; test construction, administration, scoring, and interpretation of results are studied and applied to the classroom.

EDUCATION 61, 161. Teaching of Elementary Reading and Language Arts (3). Discussions and demonstrations of principles and effective practices in the teaching of all phases of the language arts.

EDUCATION 64, 164. Principles of Elementary Education (3). The aims, organization, program and pupil population of the elementary school and the relationship between elementary and secondary schools are the areas of concentration.

EDUCATION 209. Administering Secondary Schools (3). Housing, finance, schedule, the library, guidance, cafeteria, public relations, etc. Prerequisite, teaching experience.

EDUCATION 214. Principles of Supervision (3). Principles and problems of supervision and the exercise of educational leadership in the improvement of instruction in the elementary curriculum and the secondary school content fields.

EDUCATION 215. Workshop in Individualized Instruction (6). A combined theory and practice course open to experienced teachers who will work with typical individual pupils in the Laboratory School to encourage independent work habits and creative research and study by these elementary pupils.

EDUCATION 216. Seminar on the Gifted Pupil (3). An exploration of various methods of giving enriched academic experiences to the gifted in public schools. Prerequisite, teaching experience.

EDUCATION 230. Comparative Education (3). Studies of contemporary systems of education in foreign countries. Prerequisite, Education 151.

EDUCATION 231. Contemporary Problems in Education (3). An intensive examination of several major issues confronting American education today. Evaluation, and criticism of proposals being offered for their solution.

EDUCATION 291. Educational Research (3). The principles and methods of research with special emphasis upon the technique used in Education. Statistics are studied chiefly from the standpoint of reporting and understanding the results of research.

ENGLISH 1. English Composition (2). Practice in exposition for college and professional use reinforced by adult readings and an introduction to literary criticism.

ENGLISH 25. Masterpieces of Western Literature (3). An analysis of selected masterpieces designed to enrich the student's appreciation of literary values and to sharpen his understanding of abiding human issues.

ENGLISH 51. Advanced Expository Writing (3). Practice in writing informative and persuasive prose in the form of essays, reports, and news and feature articles. Primary emphasis on clarity and development of style.

ENGLISH 53, 153. Creative Writing (3). Intensive practice in writing prose fiction, with some attention to other forms, supplemented by discussion of ideas and techniques in contemporary literature. Prerequisite, a grade of A or B in English 1 or 2, or permission of the instructor.

ENGLISH 57, 157. Major American Writers (3). Selected major American writers of the nineteenth and twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, James, Adams, Fitzgerald, and Hemingway.

ENGLISH 69, 169. The Renaissance in England (3). The non-dramatic literature of Tudor and Jacobean England in terms of emergent forms and literary ideas. Special attention to More, Spenser, Bacon, and Thomas Browne.

ENGLISH 77, 177. English Literature of the Eighteenth Century (3). The literature of the Augustan Age, with special emphasis on the writings of Swift and Pope.

ENGLISH 81, 181. English Prose of the Nineteenth Century (3). A study of the techniques and ideas of the chief prose writers, including Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincey, Carlyle, and Ruskin.

ENGLISH 201. Old English (3). Old English grammar with prose translation. This (or 203) required of all English majors.

FRENCH 7. Intermediate French; French Life and Culture (3). Selected readings from representative French literary works and a thorough review and study of grammar. Composition, intensive oral practice. Prerequisite, French 2 (Elementary).

FRENCH 54, 154. The French Novel of the Twentieth Century (3). A critical study of the contemporary French novel from Proust to the present.

FRENCH 55, 155. French Literature of the Seventeenth Century (1961-62). cal study of the contemporary French novel from Proust to the present.

FRENCH 55, 155. French Literature of the Seventeenth Century (1961-62). A study of the major genres of French Classicism, except the theater. Given in alternate years.

FRENCH. Graduate Reading Course (No credit). For graduate students wishing to prepare for the graduate reading examination.

GERMAN 1. Elementary German (3). Conversation, reading, grammar, and composition. No degree-credit granted until the completion of German 2, except upon special approval by the Provost.

GERMAN 25. Intermediate German (3). Reading, conversation, composition. Grammar review. Prerequisites, German 1 and 2.

GERMAN 53. Twentieth Century Prose (3). Main literary currents from Nietzsche to Hesse. Particular attention to the works of Thomas Mann, Kafka, and Werfel. Given in alternate years. Prerequisites, German 25 and 26.

GERMAN. Graduate Reading Course (No credit). For graduate students wishing to prepare for the graduate reading examination.

GOVERNMENT 25. American Government (3). A study of the principles, machinery, dynamics and problems of American national government.

GOVERNMENT 63, 163. Political Parties and Elections (3). A study of the American political process, with emphasis on parties, pressure groups, and public opinion.

GOVERNMENT 95, 195. Seminar (3). British Government and Politics.

GOVERNMENT 96, 196. Seminar (3). A study of special problems in the field of government. By permission of instructor.

GOVERNMENT 277. (3). Directed Studies in American politics.

HISTORY 5. Modern European Civilization (3). The historical development of the western European countries, their ideas and institutions.

HISTORY 25. The Development of American Civilization (3). A survey of the American national growth.

HISTORY 66. The History of Modern Germany (3). The evolution and development of Germany since the accession of Frederick the Great with emphasis upon diplomatic, political, military and social-economic trends and problems.

HISTORY 69, 169. Europe, 1870-1918 (3). Internal developments of the principal countries; a detailed study of conditions and diplomacy which led to the World War; and military and diplomatic history of the war years. Prerequisite, History 6.

HISTORY 72, 172. History of American Westward Expansion, 1763-1893 (3). Advance of settlement from the Appalachians to the Pacific and the influence of the frontier upon social, economic, and political conditions. Prerequisite, History 25, or permission of instructor.

HISTORY 75, 175. Europe in the Enlightenment, 1685-1789 (3). Civilization of Western Europe in the eighteenth century, its social milieu, intellectual setting, institutional forces, religious tendencies, aesthetic contributions, and the growth of revolutionary spirit.

MATHEMATICS 1. Introductory Mathematics I (3). Basic set-theoretic and axiomatic concepts, number systems and equations. A study of elementary functions, algebraically and by the methods of analytic geometry.

MATHEMATICS 29. Calculus (3). Further basic ideas and methods of analytic geometry and calculus. Prerequisite, Mathematics 4.

MECHANICAL ENGINEERING 64. Engineering Thermodynamics (3). A study of liquids and vapors, thermodynamic cycles, energy transformations, the transfer of heat plus appropriate problems. Prerequisite, Mechanical Engineering 63.

PHILOSOPHY 25. Introduction to Philosophy (3). An introduction to some of the most important of the general questions, ideas, theories and methods of enquiry which have given direction to Western thought.

PHILOSOPHY 31. Introduction to Logic and Scientific Method (3). An inquiry into the nature of critical thinking, with special emphasis on (1) the functions of language, (2) the structure of deductive arguments, (3) the nature of inductive reasoning and its application to scientific method.

PHYSICAL EDUCATION 80, 180. Driver Education Instructor Course (3). Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training.

PHYSICS 3. Introductory Physics (4). Mechanics, sound, heat; electricity, magnetism, light and modern physics, using trigonometry and algebra, but not calculus. Intended for premedical, predental, preveterinary, and some science major students. Prerequisites, Mathematics 4 previously or concurrently for Physics 3; Physics 3 for Physics 4.

PHYSICS 200A. Special Problems: Mathematical Methods of Physics (2). Selected topics in vector and tensor analysis, vector spaces, Hilbert spaces and Fourier transforms, complex variable, and partial differential equations. Prerequisite, graduation as physics major, or equivalent background in mathematics and physics.

PSYCHOLOGY 1. General Psychology (3). An introduction to the principles and study of behavior. Topics considered include development of behavior, sensation, learning, thinking, motivation, intelligence, attitudes, and personality.

PSYCHOLOGY 56, 156. Educational Psychology (3). Psychological principles and facts fundamental to educational situations. Major areas studied are: learner, learning, adjustment, guidance, teacher, teaching methods, evaluation and measurement. Prerequisite, Psychology 26 or 27.

PSYCHOLOGY 65, 165. Child Psychology (3). The psychological development of the child including maturation and development of behavior, language, emotions, intelligence, social behavior, motivation and personality. Nursery school observation and practice. Prerequisite, Psychology 26 or 27.

PSYCHOLOGY 81, 181. Psychological Tests (3). Survey of tests of intelligence, aptitude, interest, personality and adjustment. Test rationale, construction, characteristics, uses and evaluation are emphasized. Prerequisite, Psychology 26 or 27.

PSYCHOLOGY 295. Research Methodology (2). A study and evaluation of research methods and of problems in the major fields of psychology.

PUBLIC HEALTH 61. General and Community Sanitation (3). The influence of health measures on community welfare with emphasis on all phases of environmental health.

RUSSIAN 1. Elementary Russian (3). Grammar, exercises in composition and conversation, selected readings. No degree-credit granted until the completion of Russian 2, except upon special approval by the Provost. Prerequisite, previous language training.

RUSSIAN 5. Intermediate Russian (3). A review of the fundamentals of grammar followed by more advanced study of grammatical structure and idiom. Composition, conversation and readings in Russian fiction. Prerequisites, Russian 1 and 2.

SOCIOLOGY 25. Introduction to Sociology (3). A study of the social order, and of the individual considered as a member of his various groups.

SOCIOLOGY 51, 151. Urban Sociology (3). A study of urban American social conditions with reference to population, ecology, health, and the classically defined institutional complexes and their problems of adjustment. Prerequisite, Sociology 25.

SOCIOLOGY 75, 175. Social Problems (3). A consideration of the incidence, distribution and interrelations among the major types of social tensions in human societies. Various theories of causation. Research projects and field trips are required. Prerequisite, Sociology 25.

SOCIOLOGY 78. Criminology (3). The nature of crimes and the factors underlying criminal behavior. The machinery of justice; the law, courts, police systems, and correction institutions. Prerequisite, Sociology 25.

SPANISH 1. Elementary Spanish (3). For students with no previous training in Spanish. Intensive practice in the language skills. No degree-credit granted until the completion of Spanish 2, except upon special approval by the Provost.

SPANISH 7. Intermediate Spanish (3). For upperclassmen who have completed Spanish 1-2, and those Freshmen and transfer students who are found qualified by placement examination. Training in the language skills, with emphasis on speaking and understanding; readings in cultural and literary texts. Students completing Spanish 7 will fulfill the language requirement by taking Spanish 8.

SPEECH 85, 185. Introduction to Speech Pathology (3). A study of the causes, functional and organic, of speech problems among children and adults; principles of diagnosis and therapy. Observation; field trips. Prerequisite, Psychology 26.

SPEECH 88, 188. Advanced Clinical Practice (3). Advanced training in clinical practice under supervision; special consideration of organic speech disorders. Prerequisite, Speech 82.

STATISTICS 79, 179. Elementary Economic Statistics (3). Covers charting, tables, frequency distribution, central tendency, dispersion, basic concepts of reliability and significance of small samples, index numbers, simple regression and correlation and time series analysis.

ZOOLOGY 74, 174. Limnology (4). Study of inland waters from geological, physical, chemical and biological aspects. Given in alternate years. Prerequisites, Botany 1; Zoology 1; Chemistry 1, 2; and permission to register. Class enrollment will be limited to sixteen.

SECOND SUMMER TERM
(JULY 30—AUGUST 31)

AGRICULTURAL ENGINEERING 276. Advanced Agricultural Machinery Design (3). Stress analysis, periodic vibration, and shock loadings, as related to design of agricultural machinery. The mathematical definition of tillage tool surfaces. Dynamics of suspension devices, automatic release equipment and hydraulic systems. Prerequisite, Agricultural Engineering 176.

ANTHROPOLOGY 63, 163. Social Anthropology (3). An introduction to the fields of anthropology: human evolution and race; prehistory; variations among societies in kinship, economic, political and religious organizations. 3 class hours. Prerequisite, Sociology 25.

ANTHROPOLOGY 67, 167. Ethnology of Africa (3). A limited consideration of the history, physical types, social organization and culture of Africa south of the Sahara with special consideration of several diverse cultures. Prerequisite, Sociology 25.

ART 51. Water Color (3). Initial concentration on transparent water color, emphasizing control of techniques and mastery of color relationships. Further experience with opaque water color, such as gouache, casein. Prerequisites, Art 31 (Basic Design) and Art 33.

ART 52. Water Color (3). Continuation of Art 51. Prerequisite, Art 51.

Business Administration

ACCOUNTING 26. Introduction to Accounting (3). A continuation of Accounting 25 with major emphasis on accounting for corporations, partnerships and manufacturers. Prerequisite, Accounting 25.

FINANCE 76. Life Insurance (3). The application of life insurance to the problems of family security, business security, investments, and estate protection.

MANAGEMENT 61. Principles of Management (3). The basic introductory course dealing with the fundamental principles and the practices of the managerial process in business enterprise.

MANAGEMENT 64. Personnel Management (3). The principles and policies followed by management in the procurement, development, direction and control of personnel.

MARKETING 73. Advertising (3). The techniques and media of advertising, its services to business and the organization and economic functions of the advertising industry.

CHEMISTRY 2. General Chemistry (3). Continuation of Chemistry 1.

CHEMISTRY 32. Quantitative Chemical Analysis (4). A detailed study of the principles and practices of titimetric and gravimetric analysis; separation methods; introduction to physical methods. Primarily for chemistry majors and others needing a more detailed treatment than is given in Chemistry 27 (Analytical Chemistry). Prerequisite, Chemistry 29.

CHEMISTRY 52, 152. Organic Chemistry (4). Continuation of Chemistry 51, 151.

CHEMISTRY 66, 166. Physical Chemistry (3). A continuation of Chemistry 65, 165.

ECONOMICS 26. Problems of the National Economy (3). A continuation of Economics 25. Current problems, including international economic planning in peace and war. Prerequisite, Economics 25.

ECONOMICS 73, 173. Modern Economic Theory and Analysis (3). Microeconomic analysis: types of markets; applications of linear programming, theory of games and other techniques for rational business planning; balancing forces in free-enterprise economy. Prerequisite, Economics 25.

ECONOMICS 77, 177. Economics of International Trade (3). Policies, principles, and practices of international trade. Prerequisite, Economics 25.

EDUCATION 52, 152. Principles and Methods of Teaching (3). By means of discussion, case studies, and current educational literature, teaching ideals and procedures are set up and applied to the major teaching fields.

EDUCATION 60, 160. Elementary School Curriculum (3). From the standpoint of content and methodology. Emphasis on the unit method and the activity program.

EDUCATION 62, 162. Elementary School Arithmetic (3). Methods and materials in teaching arithmetic in elementary grades will be studied and demonstrated.

EDUCATION 66, 166. Preparation and Use of Audio-Visual Materials (3). Study is made of available machines, materials and techniques for teaching groups of students.

EDUCATION 77, 177. Principles of School Guidance (3). The need for guidance in the schools, the nature of guidance, and an overview of an adequate guidance service for a school system.

EDUCATION 88, 188. Secondary School Curriculum (3). Learning materials and activities and their organization in various teaching fields.

EDUCATION 130. Elementary School Science (3). Methods and new materials of instruction.

***EDUCATION 215 I. Workshop in Preparation of Secondary School Teaching Units** (3). Theory and practice in preparing units in experienced teachers' teaching fields. Special attention will be given to the inclusion of new materials of learning developed in recent curriculum studies. Prerequisite, Education 188.

***EDUCATION 215 II. Workshop in Remedial Reading Practices** (3). This may be taken in conjunction with Remedial Reading (Education 265) by a selected group of experienced teachers. It involves working with individual elementary school pupils in the Remedial Reading Clinic. Prerequisite, Education 161.

***EDUCATION 216. Seminar on Research Developments in Elementary Education** (3). Recent research and experimentation dealing with both curricular and organizational issues will be considered. Prerequisite, Education 160.

***EDUCATION 240. Occupation and Placement Counseling** (3). The collection, evaluation and use of occupational, educational, and placement information with individuals and groups of students in school guidance. Prerequisite, Education 177.

EDUCATION 265. Techniques in Remedial Reading (3). Methods and materials in diagnosis and remedial instruction. Prerequisite, Education 161.

EDUCATION 268. Seminar on Use of Teaching Machines (3). Various types of teaching machines and their uses in the teaching-learning situation. Participants will do some programming of units in their own fields.

EDUCATION 283. Comprehensive High School (3). Critical study of the historical development, objectives, course offerings, and crucial issues confronting the all-purpose high school.

ENGLISH 2. English Composition (2). Continuation of English 1.

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*Prerequisite, teaching experience.

ENGLISH 26. Masterpieces of Western Literature (3). Continuation of English 25.

ENGLISH 74, 174 Milton (3). Development of the mind and art of Milton as a figure of the English Reformation and the late Renaissance, with emphasis on *Paradise Lost.*

ENGLISH 78, 178. English Literature of the Eighteenth Century (3). The literature of the later eighteenth century with special emphasis on the Johnson Circle. A continuation of English 77 but may be elected independently.

ENGLISH 80, 180. The Romantic Poets (3). A further study of the Romantic Movement, with particular attention to Byron, Shelley, and Keats.

ENGLISH 88, 188. Modern Novel: 1920-1950 (3). An analytical presentation of some twelve novels. A continuation of English 87 but may be elected independently; no English major may, however, elect both English 87 and 88.

ENGLISH 90, 190. Modern British and American Drama (3). A study of representative dramatists since the late nineteenth century, including Shaw, Fry, O'Casey, O'Neill, Williams, and others. Emphasis on changing trends in twentieth-century dramatic art.

ENGLISH 264. Joyce, Yeats, and Eliot (3). The experiments in expressing personal experience that established the Twentieth Century literary myths.

FRENCH 8. Intermediate French; French Life and Culture (3). A study of some important literary works of the nineteenth and twentieth centuries. Compositions. Prerequisite, French 6 or 7.

GERMAN 2. Elementary German (3). Conversation, reading, grammar, and composition.

GERMAN 26. Intermediate German (3). Reading, conversation, composition. Grammar review. Prerequisites, German 1, 2 and 25.

GERMAN 54, 154. Poetry and Drama of the Twentieth Century (3). Poetry of Hofmannsthal, George and Rilke. Plays of Hauptmann, Kaiser, Brecht and others. Prerequisites, German 25 and 26.

GOVERNMENT 25. American Government (3). A study of the principles, machinery, dynamics and problems of American national government.

GOVERNMENT 26. European Government (3). A study of the politics and governmental institutions of Great Britain, France, U.S.S.R. and other European countries.

GOVERNMENT 65, 165. Constitutional Law (3). An historical study of the United States Constitution as interpreted by decisions of the Supreme Court.

GOVERNMENT 96, 196. Seminar (3). A study of special problems in the field of government. By permission of instructor.

GOVERNMENT 270. Seminar in Public Law (3). A study of selected topics in public law. Prerequisites, Government 164, 165 or equivalent.

HISTORY 6. Modern European Civilization (3). A basic survey course covering the period from 1815 to the present.

HISTORY 26. The Development of American Civilization (3). A survey of the national development including political, social, economic, and cultural factors in the growth of American democracy. This course covers the period from 1865 to the present.

HISTORY 55, 155. A History of Russia (3). A survey of the political, economic, social and intellectual development of Russia. The second semester will treat the origins of Russian Marxism and the Soviet period. Prerequisites, History 5, 6.

HISTORY 79, 179. (Summer) New England to 1860 (3). A study of the colonial and early national periods, with emphasis on the political, social, and economic aspects of life in this region.

MATHEMATICS 2. Introductory Mathematics II (3). A terminal course intended for students whose curriculum calls for just one year of mathematics. A continuation of Mathematics 1, including topics from the calculus, statistics, and mathematics of finance. Prerequisite, Mathematics 1.

MATHEMATICS 4. Introductory Mathematics IV (3). A continuation of Mathematics 1 for those students intending to take further courses in mathematics. Trigonometry, Introduction to Analytic Geometry, and Calculus. Prerequisite, Mathematics 1.

MATHEMATICS 7. Algebra and Trigonometry (3). For freshman engineers who are deficient in trigonometry. Fractions, quadratic equations, exponents, logarithms, variation, determinants of the second and third orders, and plane trigonometry.

MATHEMATICS 30. Calculus (3). A continuation of Mathematics 29 into the field of the integral calculus, with special emphasis on application to problems. Prerequisite, Mathematics 29.

PHILOSOPHY 31. Introduction to Logic and Scientific Method (3). An inquiry into the nature of critical thinking, including (1) the functions of language, (2) the structure of deductive argument, (3) a glimpse at inductive methods.

PHILOSOPHY 72, 172. Philosophy of Science (3). A critical analysis of the structure of scientific method and the language of science, the respective roles of induction and deduction in science, and the status of theoretical terms.

PHYSICAL EDUCATION 80, 180. Driver Education Instructor Course (3). Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training.

PHYSICS 4. General Physics (4). Mechanics, sound, heat; electricity, magnetism, light and modern physics; using trigonometry and algebra, but not calculus. Intended for premedical, predental, preveterinary, and some science major students. Prerequisites, Mathematics 4 previously or concurrently for Physics 3; Physics 3 for Physics 4.

PHYSICS 200B. Special Problems: Mathematical Methods of Physics (2). See page 12, under Physics 200A.

PSYCHOLOGY 88. Psychology of Guidance. The psychological principles, techniques and tests necessary in guidance. Practice in organizing and evaluating relevant data in the analysis of illustrative cases. Prerequisites, Psychology 26 or 27 and 81 or consent of the instructor.

PSYCHOLOGY 296. Research Methodology (2). A study of research methods and of problems in the major fields of psychology.

RUSSIAN 2. Elementary Russian (3). Grammar, exercises in composition and conversation, selected readings. Prerequisite, previous language training.

RUSSIAN 6. Intermediate Russian (3). Continuation of Russian 5.

SOCIOLOGY 25. Introduction to Sociology (3). A study of the social order and of the individual consideration as a member of his various groups.

SOCIOLOGY 59. Social Stratification (3). The factors which make for institutionalized inequality in social life. A consideration of castes and classes in American society. Prerequisite, Sociology 25.

SOCIOLOGY 95, 195. Seminar, Research Methods (3) A consideration of research methods and techniques employed in sociology. Each student is required to design and complete a research project of limited scope. Prerequisite, Sociology 25.

SPANISH 2. Elementary Spanish (3). The essentials of Spanish grammar, intensive oral drill and intensive reading of short stores. Prerequisite, Spanish 1.

SPANISH 8. Intermediate Spanish: Hispanic Culture (3). For students who have completed Spanish 6 or 7, or by special permission of the department. Continuation of language skill training, with emphasis on reading and discussion of cultural and literary texts; composition.

SPEECH 81. Phonetics (3). A scientific study of the sounds of English; descriptive analysis of individual vowels and consonants. Study of the International Phonetic Alphabet; training in auditory discrimination.

SPEECH 82. Introduction to Clinical Practice (3). Training is basic diagnostic and therapeutic techniques for various speech handicaps; emphasis on articulation defects, delayed speech and stuttering. Supervised practice required. Prerequisites, Speech 81, 85.

STATISTICS 77, 177. Elementary Experimental Statistics (3). Covers basic concepts and techniques for determining reliability and significance of small samples. Confidence limits: X^2, t, and F tests, and simple regression and correlation.

ZOOLOGY 1. Introductory Zoology (3). Introduction to the principles of biology with special reference to the zoological aspects; protoplasm and the cell, vertebrate anatomy and physiology, embryology, genetics, principles of classification, comprehensive survey of major groups of the animal kingdom, and evolution.

SPECIAL COURSES

School of Engineering

CHEMICAL ENGINEERING 75. Instrumentation. A detailed study of the underlying principles and practices of indicating, recording and controlling instruments used on industrial process equipment. Credit 3

Three 40-hour weeks: June 4-22; August 20-Sept. 7.
Engineering Annex Mr. Cashin and Mr. Goda

Prerequisites, Physics 27, 28; Chemical Engineering 55, Calculations.

CIVIL ENGINEERING 27. Plane Surveying. The basic principles of mensuration; use of tape, transit, and level; a brief consideration of route surveying for forestry majors. Credit 3

Three 40-hour weeks: July 16-August 3. Mr. Grow and Mr. Hendrickson
Engineering Building

Prerequisites, Mathematics 5, Introductory Engineering Mathematics, or Mathematics 7, Algebra and Trigonometry.

ELECTRICAL ENGINEERING 85. Electrical Measurements. Theory and practice of electric and magnetic measurements; accuracy, precision, and limitations of measurements devices. Credit 3

Three 40-hour weeks: July 30-August 17; August 20-September 7.
Engineering Building Mr. Langford and Mr. Roys

Prerequisite, Electrical Engineering 42.

MECHANICAL ENGINEERING 23. Shop. Welding and machine shop, use of various machine and hand tools used in metal working. Credit 3

Three 40-hour weeks: July 30-August 17; August 20-September 7.
Engineering Shop Mr. Costa and Mr. Patterson

MECHANICAL ENGINEERING 27. Shop. Welding, manual and automatic. For mechanical engineering majors. Credit 3

Three 40-hour weeks: June 4-22; June 25-July 13.
Engineering Shop Mr. Costa and Mr. Patterson

MECHANICAL ENGINEERING 28. Machine Shop. The fundamental machine tools; lathe, planer, shaper, milling machine and drill press. Credit 3

Three 40-hour weeks: June 4-22; June 25-July 13.
Engineering Shop Mr. Day and Mr. Hopkins

Department of Forestry and Wildlife Management

FORESTRY 55, 155. The Elements of Forest Mensuration. Methods of determining the volume and value of the forest growing stock; type mapping; methods of predicting growth of trees and stands. Credit 3

Three 44-hour weeks: June 4-22. Mr. MacConnell and Mr. Mawson
Conservation Building

FORESTRY 78. Harvesting of Forest Products. Practice in the harvesting and preparation of direct forest products. Field trips to active forest properties and to visit pulpwood operations and manufacturing plants. Credit 3

Three 44-hour weeks: June 25-July 13 — Mr. MacConnell and Mr. Foster
Conservation Building

School of Home Economics

HOME ECONOMICS 195. New Trends in Foods Seminar. A consideration of the technological, sociological, and economic implications of recent developments in the field of foods. Special emphasis will be given to Chemical Additives, Consumer Protection, Processing, Packaging, and New Foods; and the adjustment of Home Economics Programs to changing trends in foods.

June 25 through June 29 — Graduate credit 1
Daily, Monday through Friday, 9-5.
Skinner Hall — Marjorie M. Merchant, Mrs. Jane F. McCullough, Dorothy Davis

HOME ECONOMICS 195. Design Seminar. A study of basic art and design theories and principles, and their application to daily living.

July 9-14 — Graduate credit 1
Daily, Monday through Friday, 9-5.
Skinner Hall — Dr. Gertrude Esteros of Univ. of Minn., Guest Professor; and staff

HOME ECONOMICS 195. Human Development Seminar. The development of the human being from infancy to old age, with consideration of roles and relationships at various stages of development. Prerequisites: Basic courses in human biology, psychology, and sociology; or permission of instructor.

July 16 through 27. — Graduate credit 2
Daily, Monday through Friday, 9-5.
Skinner Hall — Joseph D. Burroughs

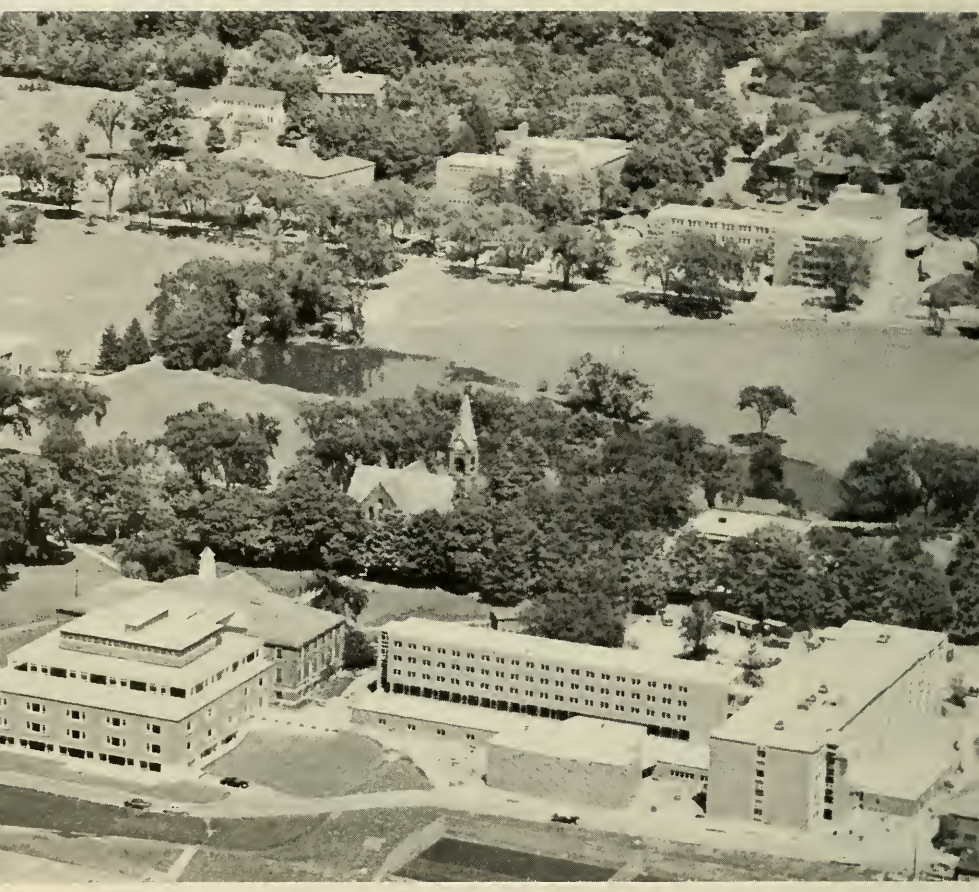
School of Nursing

Undergraduate Continuing Courses for Students Enrolled in the Basic Nursing Program of the School of Nursing

NURSING 57(S). Human Growth and Development. The course is developed around the growth and development of the child and responsibilities of marriage and family living. Field practice is afforded in selected community agencies.

June 25-July 27 — Credit 3
Hours to be arranged. — Miss Gellestrina DiMaggio, R.N., M.A., Associate Professor of Maternal & Child Nursing, and the Professional Staff of Community Agencies

The ongoing University program . . .



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and the arts . . .

serious study . . .

and a pleasant atmosphere

Job Related Work Conferences

Professional Graduate Nurses

(The School reserves the right to withdraw the offering if the enrollment is less than 10.)

NURSING 58(S) G.N. Principles of Public Health Nursing. The work conference emphasizes the philosophy, scope, and purpose of public health nursing. Content is focused on public health nursing practice in "family-centered" services. Enrollment is limited to 20.

June 25 through July 7 — Credit 2
1st week M-T-W-Th-F, 2nd week M-T-Th-F-S } 9-12 noon and 1-3 P.M.

Miss Evelyn M. Byrne, R.N., M.S.,
Assistant Professor, Public Health Nursing

NURSING 70(S) G.N. Supervision of Nursing Practice. Emphasis will be placed on the principles of supervision and the relationship of the supervisory process and practice to the improvement of the nursing care. Enrollment is limited to 20. Prerequisite, Professional nurses who are or have been directly responsible for the supervision of nursing care.

July 9 through July 20 — Credit 2
M-T-W-Th-F noon and 1-3 P.M.

Mrs. Anne L. Towney, R.N., M.S.,
Associate Professor, Simmons College
School of Nursing
Visiting Faculty Member

NURSING 60(S) G.N. Patients' Needs and Comprehensive Nursing Care. The work conference is designed to enable the nurse to gain a broader understanding of the professional practitioner's role and responsibility for comprehensive nursing care. Time will be allocated for demonstration and practice. *This work conference will be held at the Springfield Municipal Hospital, Springfield, Mass.* Enrollment is limited to 30.

July 9 through July 20 — Credit 2
M-T-W-Th-F 9-12 noon and 1-3 P.M.

Miss Alice M. Davis, R.N., M.S.,
Consultant in Chronic Disease Nursing,
Mass. Department of Public Health
Miss Genevieve M. Crowley, R.N., M.S.N.,
Assistant Professor, Psychiatric-Mental Health Nursing

SUMMER SESSION FEATURES AT OTHER NEW ENGLAND LAND-GRANT UNIVERSITIES

The following special summer courses are available at the institutions listed below:

University of Connecticut

American Maritime History—a unique history course in the setting of Mystic Seaport.

Graduate program in Physical Education.

Graduate program in Industrial Arts Education

Workshop in Special Education.

Methods of Play Production—combines theatre study with practical experience provided by summer stock theatre.

University of New Hampshire

Summer Youth Music School
Coeducational

Sixteenth Year — Aug. 19-Sept. 1

Daily classes with individual and group instruction. Two public concerts given by students. Supervised dormitories, extra-curricula and recreational programs. Guest conductors from America's foremost music schools. For brochure write: Prof. Karl H. Bratton, Chairman, Department of Music, University of New Hampshire, Durham, N. H.

Writers' Conference

Twenty-Fifth Annual Session — Aug. 21-Sept. 1

Intended for writers of all ages, experienced and inexperienced; for interested teachers, for students of contemporary letters. Staff members serve, not as formal teachers, but as leaders in discussions of mutual problems. For descriptive brochure write: Conferences and Institutes, University of New Hampshire, Durham, New Hampshire.

Public Librarary Techniques

Eighth Annual Session — July 9-27

Non-credit courses, part of a four-year program, are planned for library workers needing a knowledge of library skills, techniques, and an understanding of the purpose, organization, and activities of small public libraries. Courses cover administrative practice, organizing materials, cataloguing, selecting and promoting reading for children, young people and adults. A certificate is awarded to students completing the prescribed number of courses. For brochure write: Conferences and Institutes, University of New Hampshire, Durham, N. H.

University of Rhode Island

Art Workshop by the Sea July 2-August 10.
Art Study Tour of Japan July 9-August 7.
Summer Course in Gas Chromatography July 16-July 20.
Counseling and Guidance Training Institute July 2-August 10.
Interprofessional Workshop in Human Relations June 24-June 30.
Conference on Reading and the Language Arts July 2-July 13.
Conference of the Social Studies: The European Movement.
Toward Economic and Political Cooperation Since 1948 July 16-July 27.
Theatre Workshop July 2-August 10.
Recent Developments in Food and Nutrition July 9-July 27.

University of Vermont

Technological Developments in Teaching.
(Teaching Machines)
Teaching Foreign Languages in the Elementary School.
Reading German for Ph.D. Candidates.
Workshop in Ethnic Problems and Intergroup Relations.
School Library Administration.
Reference Materials and Teaching the Use of the Library.
Warren R. Austin Institute in World Understanding—Lectures and discussions by international leaders: July 9 through August 17.

GENERAL INFORMATION

Class schedules for most courses are listed on the following pages. The timetables for special courses in Engineering, Forestry, Nursing, and Home Economics are included in the course-descriptions in the bulletin. Summer Session classes are scheduled in three morning periods of ninety minutes each and an afternoon period. The clock hours for the afternoon period are indicated; the hours for the three morning periods are as follows:

Period	
1	8:00 - 9:30
2	9:45 - 11:15
3	11:30 - 1:00

Abbreviations for Names of University Buildings

B.	Bartlett Hall
C.H.	Clark Hall
Dra.	Draper Hall
Ed.	Education Building
E.B.	Engineering Building
G.	Goessmann Laboratory
H.	Hasbrouck Laboratory
H.P.	Hicks Physical Education Building
Mach.	Machmer Hall
M.	Morrill Science Center
O.C.	Old Chapel
P.H.B.	Public Health Building
Sk	Skinner Hall

Final Examination Schedule—Summer Session 1962

Final exams are scheduled according to the table below:

Time of Meeting on Daily Schedule	*Time of Final Exam First Term*	*Time of Final Exam Second Term*
Period (1)	July 27, 8-10 a.m.	August 31, 8-10 a.m.
Period (2)	July 28, 8-10 a.m.	August 30, 2-4 p.m.
Period (3)	July 27, 2-4 p.m.	August 30, 8-10 a.m.
Afternoon Period	July 27, 10:40 a.m. to 12:40 p.m.	August 30, 10:40 a.m. to 12:40 p.m.

Rooms for the examinations are the same as those on the daily schedule.

TIMETABLE

FIRST TERM

(June 25 - July 28)

Course	Credit	Meeting Period	Building and Room	Instructor
AGRICULTURAL ENGINEERING				
276—Advanced Agricultural Machinery Design (To span both terms)	3	By arrgt.		Whitney
ART				
33, 34—Basic Drawing	3	1:45-5, M-F	B., 225	
57, 58—Printmaking	3	(1, 2)		
BACTERIOLOGY				
31—Introductory Bacteriology	4	Lect. (2) Lab. 2-4 M-Th	P.H.B., 208	
BOTANY				
1	3	1:45-4:30, M-F	C.H., 202	Miss Durick
BUSINESS ADMINISTRATION				
Accounting 25—Introduction to Accounting	3	(1)	Dra., 111	Anderson
Accounting 73—Federal Income Tax Procedures	3	(2)	Dra., 111	Lentilhon
Finance 65—Corporation Finance	3	(1)	Dra., 117	Rivers
General Business 71—Business Law	3	(1)	Dra., 124	Burak
Marketing 53—Marketing Principles	3	(3)	Dra., 117	Zane
Marketing 54—Salesmanship and Sales Management	3	(3)	Dra., 124	Johnson
Marketing 71—Retail Merchandising	3	(3)	Dra., 111	Drew-Bear
CHEMISTRY				
1—General Chemistry	3	1:45-4:30, M-F	G., Peters, 57	Oberlander
29—Qualitative Analysis	4	Lab. (1, 2) Lect. 1:45-2:45 M-F	G., 7 G., 26	Wynne
51, 151—Organic Chemistry	4	Lab. 1:45-5 T, Th. Lect. (2)	G., 112 G., 51	 Organic Staff
65, 165—Physical Chemistry	3	(1)	G., 51	Physical Staff
ECONOMICS				
25—Elements	3	(1)	Mach., W13	Miller
53, 153—Money, Banking, and Credit	3	(2)	Mach., W13	Miller
70, 170—Structure of American Industry	3	(1)	Mach., W17	Howard
EDUCATION				
51, 151—History of Education I II	3 3	(1) (3)	Ed., 225 Ed., 227	Osgood
53, 153—Educational Tests and Measurements	3	(1)	Ed., 126	Archer
61, 161—Elementary School Reading and Language Arts	3	(1)	Ed., 123	Byrne

Course	Credit	Meeting Period	Building and Room	Instructor
EDUCATION—*Continued*				
64, 164—Principles of Elementary Education	3	(2)	Ed., 130	Miss McManamy
209—Secondary School Administration	3	(2)	Ed., 223	Oliver
214—Principles of Supervision	3	(1)	Ed., 130	Bertrand
215—Workshop in Individualized Instruction	6	9:00—11:30 2:00—3:00 p.m.	Ed., 130	Stinson
216—Seminar on Gifted Pupil	3	(3)	Ed., 230	Miss McManamy
230—Comparative Education	3	(3)	Ed., 225	Osgood
231—Contemporary Problems in Education	3	(2)	Ed., 227	
291—Educational Research	3	(3)	Ed., 126	Archer
ENGLISH				
1—Composition I	2	(2)	B., 316	Ratner
II	2	(3)	B., 316	Tucker
25—Masterpieces of Western Literature I	3	(1)	B., 325	Mitchell
II	3	(2)	B., 325	Barron
III	3	(3)	B., 325	Ratner
51—Advanced Expository Writing	3	(2)	B., 312	Mitchell
53, 153—Creative Writing	3	(1)	B., 312	Tucker
57, 157—Major American Writers	3	(2)	B., 308	Kaplan
69, 169—The Renaissance in England	3	(3)	B., 308	Lane
77, 177—English Literature of the Eighteenth Century	3	(1)	B., 308	Barron
81, 181—English Prose of the Nineteenth Century	3	(2)	B., 310	
201—Old English	3	(1)	B., 316	Lane
FRENCH				
7—Intermediate French	3	(1)	B., 107	
54, 154—French Novel of the Twentieth Century	3	(3)	B., 107	Miss Clarke
55, 155—French Literature of the Seventeenth Century	3	(1)	B., 202	Johnson
Graduate Reading Course	None	(2)	B., 202	Johnson
GERMAN				
1—Elementary German I	3	(1)	Mach., W15	Miss Schiffer
II	3	(2)	Mach., W15	Miss Schiffer
25—Intermediate German	3	(1)	B., 208	Schaefer
53, 153—Twentieth Century Prose	3	(2)	B., 208	Heller
Graduate Reading Course	None	(3)	B., 208	Heller
GOVERNMENT				
25—American Government	3	(1)	Mach., W23	Pear
63, 163—Political Parties and Elections	3	(1)	Mach., W25	Fenton
95, 195—British Government and Politics	3	(2)	Mach., W23	Pear
96, 196—Seminar	3	By arrgt.		Harris
277—Directed Studies in American Politics	3	(3)	Mach., W23	Fenton

Course	Credit	Meeting Period	Building and Room	Instructor
HISTORY				
5—Modern European Civilization	3	(1)	B., 227	Greenbaum
25—Development of American Civilization	3	(1)	B., 61	Davis
66, 166—History of Modern Germany	3	(1)	B., 323	van Steenberg
69, 169—Europe: 1870-1918	3	(3)	B., 227	van Steenberg
72, 172—History of American Westward Expansion	3	(3)	B., 61	Davis
75, 175—Europe in the Enlightenment	3	(2)	B., 227	Greenbaum
MATHEMATICS				
1—Introductory Mathematics	3	(3)	Mach., W27	Bussel
29—Calculus	3	(1)	Mach., W27	Bussel
MECHANICAL ENGINEERING				
64—Engineering Thermodynamics	3	(2)	G.L., 10	Swenson
PHILOSOPHY				
25—Introduction to Philosophy	3	(2)	B., 206	Ehrlich
31—Introduction to Logic and Scientific Method	3	(3)	B., 206	Ehrlich
PHYSICAL EDUCATION FOR MEN				
80, 180—Driver Education Instructor Course	3	By arrgt.		Briggs
PHYSICS				
3—General Physics	4	(1, 2)	H., 100, 106	Crooker
200A—Mathematical Methods	2	(2)	H., 111	Mrs. Fuller
PSYCHOLOGY				
1—General Psychology	3	(1)	B., 109	Wagner
56, 156—Educational Psychology	3	(1)	B., 119	Schumer
65, 165—Child Psychology	3	(2)	B., 109	Price
81, 181—Psychological Tests	3	(3)	B., 3	Schumer
295—Research Methodology	2	By arrgt.		Price
PUBLIC HEALTH				
61, 161—General and Community Sanitation	3	(1)	P.H.B., 208	Wisnieski
RUSSIAN				
1—Elementary Russian	3	(1)	B., 210	Weeks
5—Intermediate Russian	3	(2)	B., 210	Weeks
SOCIOLOGY				
25—Introduction	3	(1)	Mach., E35	Manfredi
51, 151—Urban Sociology	3	(3)	Mach., E35	Manfredi
75, 175—Social Problems	3	(1)	Mach., E37	Driver
78—Criminology	3	(2)	Mach., E37	Driver
SPANISH				
1—Elementary Spanish	3	(1)	B., 205	Ebersole
7—Intermediate Spanish	3	(2)	B., 205	Ebersole

Course	Credit	Meeting Period	Building and Room	Instructor
SPEECH				
85, 185—Introduction to Speech Pathology	3	(2)	B., 114	Miss Hegarty
88, 188—Advanced Clinical Practice	3	(3)	B., 110	Miss Hegarty
STATISTICS				
79, 179—Elementary Economic Statistics	3	Lect. (1) Lab. by arrgt.		Russell
ZOOLOGY				
74, 174—Limnology	4	Lect. (2) Lab. (2-5), M-F	M., 138 M., 332	

SECOND TERM

(July 30 - August 31)

Course	Credit	Meeting Period	Building and Room	Instructor
AGRICULTURAL ENGINEERING				
276—Advanced Agricultural Machinery Design	3	By arrgt.		Whitney
ANTHROPOLOGY				
63, 163—Social Anthropology	3	(2)	Mach., E37	
67, 167—Ethnology of Africa	3	(3)	Mach., E37	
ART				
51, 52—Water Color	3	(1, 2)	B., 209	
BUSINESS ADMINISTRATION				
Accounting 26—Introduction to Accounting II	3	(1)	Dra., 111	Singer
Finance 76—Life Insurance	3	(2)	Dra., 122	Kyler
Management 61—Principles of Management	3	(3)	Dra., 8	O'Donnell
Management 64—Personnel Management	3	(2)	Dra., 8	O'Donnell
Marketing 73—Advertising	3	(3)	Dra., 117	Hardy
CHEMISTRY				
2—General Chemistry	3	1:45-4:30, M-F	G., Peters, 57	Zajicek
32—Quantitative Chemical Analysis	4	Lect. (2)	G., 26	
		Lab. 1:45-5:15 M-F	G., 228	Proctor
52, 152—Organic Chemistry	4	Lect. (2)	G., 51	
		Lab. 1:45-5 T, Th.	G., 112	Organic Staff
66, 166—Physical Chemistry	3	(1)	G., 51	Physical Staff
ECONOMICS				
26—Problems of the American Economy	3	(1)	Mach., W13	
73, 173—Modern Economic Theory	3	(2)	Mach., W13	Martin
77, 177—Economics of International Trade	3	(3)	Mach., W13	Martin
EDUCATION				
52, 152—Principles and Methods of Teaching I	3	(1)	Ed., 20	Thelen
II	3	(2)	Ed., 222	Anthony
60, 160—Elementary School Curriculum	3	(1)	Ed., 22	Hale
62, 162—Elementary School Arithmetic	3	(3)	Ed., 130	Hall
66, 166—Audio-Visual Materials in Teaching	3	(3)	Ed., 122	Wyman
77, 177—Principles of School Guidance	3	(2)	Ed., 128	Pippert
88, 188—Secondary School Curriculum I	3	(1)	Ed., 223	Barfield
II	3	(3)	Ed., 20	Thelen

Course	Credit	Meeting Period	Building and Room	Instructor
EDUCATION—*Continued*				
130—Elementary School Science	3	(1)	Ed., 130	Hall
215—I—Workshop in Preparation of Secondary Teaching Units	3	(1)	Ed., 223	Barfield
215—II—Workshop in Remedial Reading Practices	3	(2)	Ed., 125	Miss O'Leary
216—Seminar on Research Developments in Elementary Education	3	(3)	Ed., 22	Hale
240—Occupation and Placement Counselling	3	(3)	Ed., 128	Pippert
265—Techniques in Remedial Reading	3	(1)	Ed., 125	Miss O'Leary
268—Seminar on the Use of Teaching Machines	3	(1)	Ed., 122	Wyman
283—Comprehensive High School	3	(1)	Ed., 222	Anthony
ENGLISH				
2—Composition I	3	(2)	B., 316	Gozzi
II	3	(3)	B., 316	Wolf
26—Masterpieces of Western Literature I	3	(1)	B., 325	O'Donnell
II	3	(2)	B., 325	Varley
III	3	(3)	B., 325	Gozzi
74, 174—Milton	3	(2)	B., 312	Wolf
78, 178—English Literature of the Eighteenth Century	3	(1)	B., 308	Moser
80, 180—The Romantic Poets	3	(3)	B., 308	
88, 188—The Modern Novel, 1920-1950	3	(2)	B., 308	O'Donnell
90, 190—Modern British and American Drama	3	(1)	B., 312	
264—Joyce, Yeats, and Eliot	3	(1)	B., 316	Varley
FRENCH				
8—Intermediate French	3	(1)	B., 107	
GERMAN				
2—Elementary German I	3	(1)	B., 202	Hauser
II	3	(2)	B., 202	Stawiecki
26—Intermediate German	3	(1)	B., 208	Stawiecki
54, 154—Poetry and Drama of the Twentieth Century	3	(2)	B., 208	Hauser
GOVERNMENT				
25—American Government	3	(1)	Mach., W23	Harris
26—Comparative Government	3	(2)	Mach., W23	Harris
65, 165—Constitutional Law	3	(1)	Mach., W25	Beth
96, 196—Seminar	3	By arrgt.		Harris
270—Seminar in Public Law	3	(3)	Mach., W23	Beth
HISTORY				
6—Modern European Civilization	3	(2)	B., 227	Miller
26—Development of American Civilization	3	(3)	B., 227	Bernhard
55, 155—History of Russia	3	(1)	B., 227	Miller
79, 179—New England to 1860	3	(2)	B., 323	Bernhard

Course	Credit	Meeting Period	Building and Room	Instructor
MATHEMATICS				
2—Introductory Mathematics II	3	(3)	Mach., W27	Azpeitia
4—Introductory Mathematics IV	3	(3)	Mach., W21	Boutelle
7—Algebra and Trigonometry	3	(1)	Mach., W21	Boutelle
30—Calculus	3	(1)	Mach., W27	Azpeitia
PHILOSOPHY				
31—Introduction to Logic and Scientific Method	3	(1)	B., 206	Swanson
72, 172—Philosophy of Science	3	(2)	B., 206	Swanson
PHYSICAL EDUCATION FOR MEN				
80, 180—Driver Education Instructor Course	3	By arrgt.		Briggs
PHYSICS				
4—General Physics	4	(1, 2)	H., 100, 106	Mathieson
200B—Mathematical Methods	2	(2)	H., 111	Mrs. Fuller
PSYCHOLOGY				
88, 188—Psychology of Guidance	3	(2)	B., 109	
296—Research Methodology	2	By arrgt.		
RUSSIAN				
2—Elementary Russian	3	(1)	B., 210	Pastuhov
6—Intermediate Russian	3	(2)	B., 210	Pastuhov
SOCIOLOGY				
25—Introduction to Sociology	3	(3)	Mach., E36	Lopreato
59—Social Stratification	3	(2)	Mach., E35	Lopreato
95, 195—Seminar, Research Methods	3	(3)	Mach., E35	Lovald
SPANISH				
2—Elementary Spanish	3	(1)	B., 205	Stais
8—Intermediate Spanish	3	(2)	B., 205	Stais
SPEECH				
81—Phonetics	3	(2)	B., 110	Miss Hanifan
82—Introduction to Clinical Practices	3	(3)	B., 110	Miss Hanifan
STATISTICS				
77, 177—Elementary Experimental Statistics	3	(1)	Mach., E35	Lovald
ZOOLOGY				
1—Introductory Zoology	3	1:45-4:30, M-F	M., 138, 332	Spandorf

UNIVERSITY OF MASSACHUSETTS
SUMMER SESSION

Application for Undergraduate Students

Prospective undergraduate students should fill out this page and the following page and send to the registrar, University of Massachusetts.

This application is primarily for students who attend or have attended other colleges. Under certain circumstances (e.g., for professional improvement), persons who have not attended college may qualify. Such persons should submit a letter to the Registrar with the application stating their academic background and their reasons for wanting to take the courses they have selected. Regularly enrolled students at the University of Massachusetts should secure and file a special Summer School application at the Registrar's Office.

Name Mr. / Mrs. / Miss ..... (Last / First / Middle)

Home address ..... (Street and Number)

..... (City / State)

Date of Birth .....Sex.....Single.....Married.....

Secondary School .....Attendance Dates.....

College(s) attended .....Attendance Dates.....

If not now attending, what was your reason for leaving? .....

.....

Have you ever applied for admission to the University of Massachusetts? .....

If so, when? .....

Will you commute from home? ..... or require a dormitory room? .....

In order to attend the University of Massachusetts Summer School, a student must be in good standing (eligible to continue studying) at the college which he attended. Have the following statement completed by your Registrar. A transcript of record is not required.

This is to certify that .....
(Student's name)

is (or left) in good standing at .....
(Name of college)

and has our approval to take the courses listed on this application.

Signed.....

Tentative Program

The normal program consists of one course during the special session and two courses during each main summer term. An additional course can be approved only in case the student's academic record is high. (See page 6 under heading "Study Load.")

List the department, number, and title, as they appear in the catalog, for which you wish to be registered (e.g., Art 33, Freehand Drawing).

First Main Term:

.....

.....

Second Main Term:

.....

.....

CERTIFICATION OF RESIDENCE

To be entitled to the low tuition rate established for residents of Massachusetts, applicants for admission to the University Summer Session must return this form with the application.

Student's Name .....

Statement of Town or City Clerk

This will certify that .....
Parent or guardian's name or student's name if over 21

is a resident of .....
Town or City

Massachusetts, on ..... 196.....
Date

Signed .....

(Seal)

Title .....

NOTE: For the purposes of this certification, a person is considered a resident who has established a bona fide residence or domicile in the Commonwealth with the intention of continuing to maintain it as such.

Summer School Residence

To be filled in by *all* students.

Sex: Male.....

Female.....

Single..... Married..... Date of Birth.....

Name..... Class.....
Last First Middle

Home Address.....
No. and Street City State

Period of Planned Attendance: First term (dates).....

Second term (dates) .....

Special Session (list dates) .....

If commuting from home of parents or spouse, give name and address .....

.....

.....

Where enrolled or working last year.....

Dormitory room preference: ....
no preference double single triple

(Most rooms are double; a few singles and triples are available.)

Indicate physical limitations, if any.....

If you have a choice of roommate, list name.....

Signed .....

Address .....

UNIVERSITY OF MASSACHUSETTS
SUMMER SESSION

Application Procedures for Graduate Students

Prospective graduate students (except those enrolled at the University during the spring semester) should *fill out and send this page and the preceding page* to the Dean, Graduate School, University of Massachusetts, as soon as possible. In this way, admission to courses with limited enrollment can be assured.

Graduate students intending to start work toward an advanced degree at the University of Massachusetts must submit a graduate application blank *(write to above address for this blank),* two *official* transcripts and two letters of recommendation from persons qualified to judge ability in academic work.

Graduate students who wish to study here for the summer with no intention of working for an advanced degree at this University must submit graduate application blank *(write to above address for this blank)* and two *official* transcripts. Students in this category will be considered Special Graduate Students.

All applicants to the School of Education must submit two transcripts and two letters of recommendation.

Name Mr. / Mrs. / Miss ..... (Last / First / Middle)

Home Address ..... (Street and Number)

..... (City / State)

Date of Birth .....Sex.....Single.....Married.....

College(s) Attended .....Attendance Dates.....

What degrees and where earned .....

Will you be studying under the G. I. Bill? .....

Will you require a dormitory room? ..... If so, return application for dormitory room.

Will you commute from home? .....

Tentative Program

A normal program consists of one course during the special session and two courses during each of the main summer terms. An additional course can be approved only in case the student's academic record is high. (See page 6, under heading, Study Load.)

List the courses for which you wish to be registered.

Courses:	*Name and Number*	*Descriptive Title*
First Summer Term:		
.....		
.....		
Second Summer Term:		
.....		
.....		

In addition to its program of instruction during the regular academic year and Summer Sessions, the University of Massachusetts has been a focal point for gatherings of educators, research workers, government officials, and citizens who meet to discuss problems related to the advancement of academic, professional, vocational, civic and cultural interests.

OTHER BULLETINS:

UNDERGRADUATE COURSES

GRADUATE COURSES

STOCKBRIDGE SCHOOL

UNIVERSITY OF MASSACHUSETTS

BULLETIN

UNDERGRADUATE SCHOOLS | 1962-63

UNIVERSITY
of
MASSACHUSETTS
Amherst

Catalogue of the University
1962-1963

FOREWORD

This Catalogue of the University of Massachusetts presents announcements concerning its Colleges, Schools and Divisions for the sessions of 1962-1963.

The University reserves, for itself and its departments, the right to withdraw or change the announcements made in its Catalogue.

VOLUME LIV MARCH, 1962 NUMBER II

Published four times a year by the University of Massachusetts in February, March, August and November.

Second class mail privileges authorized at Amherst, Mass.

The University Catalogue for the sessions 1962-1963 is part of the Ninety-eighth Annual Report of the University of Massachusetts and as such is part II of Public Document 31, Sec. 8, Chapter 75, of the General Laws of Massachusetts.

PUBLICATION OF THIS DOCUMENT APPROVED BY
ALFRED C. HOLLAND, STATE PURCHASING AGENT

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Correspondence regarding various phases of the University program should be directed as follows:

Office of the President
JOHN W. LEDERLE

Academic Affairs
GILBERT L. WOODSIDE, *Provost*

Admission, Registration and Transcripts
MARSHALL O. LANPHEAR, *Registrar*

Expenses, Payments
KENNETH JOHNSON, *Treasurer*

Extra-Curricular Activities
WILLIAM D. SCOTT, *Director, Student Union*

Four College Cooperation
GILBERT L. WOODSIDE, *Provost*

Graduate School
GILBERT L. WOODSIDE, *Acting Dean*

Housing
HERBERT A. RANDOLPH, *Housing Supervisor*

Loans
DAVID LAWRENCE, *Assistant Director of Placement—Men*

Men's Affairs
ROBERT S. HOPKINS, *Dean of Men*

Publications, News
WILLIAM DEMINOFF, *Director of Publications and News Editor*

Scholarships
DAVID LAWRENCE

Short Courses
FRED P. JEFFREY, *Associate Dean, College of Agriculture*

Stockbridge School of Agriculture
FRED P. JEFFREY, *Director*

Student Affairs
WILLIAM F. FIELD, *Dean of Students*

Student Employment
ROBERT J. MORRISSEY, *Director of Placement*
GEORGE E. EMERY, *Placement Officer*

Summer Sessions
OFFICE OF THE PROVOST

Veterans' Affairs
GEORGE E. EMERY, *Veterans' Coordinator*

Women's Affairs
HELEN S. CURTIS, *Dean of Women*

CALENDAR

1962-1963

Spring Semester

February

1—Thursday. Registration.
2—Friday. Classes begin at 8 a.m.
22—Thursday. Washington's Birthday. No classes.

March

24—Saturday. Marks close for mid-semester reports.

April

2—Monday. Classes resume at 8 a.m.
17—Tuesday. Thursday class schedule will be followed.
18—Wednesday. Easter recess begins after last class.
24—Tuesday. Classes resume at 8 a.m.

May

2—Wednesday. Counseling Day for undergraduate students.
10—Thursday. Honors Day.
24—Thursday. Last day of classes.
25—Friday. Final examinations begin at 8 a.m.
30—Wednesday. Memorial Day. No examinations.

June

4—Monday. Final examinations end at 5:30 p.m.
8, 9, 10—Friday, Saturday, Sunday. Commencement weekend.

SUMMER SESSIONS

First Term — June 25-July 26
Second Term — July 30-August 31

Fall Semester

September

11—Tuesday. Registration.
12—Wednesday. Classes begin at 8 a.m.

October

12—Friday. Columbus Day. No classes.

November

3—Saturday. Mid-semester marks close.
12—Monday. Veteran's Day. No classes.
20—Tuesday. Thanksgiving recess begins after last class.
26—Monday. Classes resume at 8 a.m.

December

4—Tuesday. Counseling Day for undergraduate students.
19—Wednesday. Christmas recess begins after last class.

1963

January

3—Thursday. Classes resume at 8 a.m.
11—Friday. Last day of classes.
14—Monday. Final examinations begin at 8 a.m.
22—Tuesday. Final examinations end at 5:30 p.m.

Spring Semester

January

31—Thursday. Registration.

February

1—Friday. Classes begin at 8 a.m.
22—Friday. Washington's Birthday. No classes.

March

23—Saturday. Mid-term marks close. Spring recess begins after last class.

April

1—Monday. Classes resume at 8 a.m.
11—Thursday. Easter recess begins after last class.
15—Monday. Classes resume at 8 a.m. Friday class schedule will be followed.
19—Friday. Patriot's Day. No classes.

May

7—Tuesday. Counseling Day for undergraduate students.
9—Thursday. Honors Day.
22—Wednesday. Last day of classes. Friday class schedule will be followed.
24—Friday. Final examinations begin at 8 a.m.
30—Thursday. Memorial Day. No examinations.

June

3—Monday. Final examinations end at 5:30 p.m.
7, 8, 9—Friday, Saturday, Sunday. Commencement Weekend.

UNDERGRADUATE MAJORS

College of Arts and Sciences

Art
Astronomy (Four College Cooperation Program)
Botany
Chemistry
Economics
English
Geology
German
Government
History
Journalism
Mathematics
Microbiology
Music
Philosophy
Physics
Pre-Dental
Pre-Medical
Pre-Veterinary
Psychology
Romance Languages
Russian
Sociology and Anthropology
Speech
Zoology

College of Agriculture

Agricultural Business
Agricultural Engineering
Agronomy
Animal Science
Dairy Technology
Entomology
Food Distribution
Food Management
Food Technology
Forestry
Horticulture
Landscape Architecture
Plant Pathology
Poultry Science
Wildlife Management

School of Business Administration

Accounting
General Business
Business Administration and Economics
Finance
General Management
Marketing
Personnel Management and Industrial Relations
Production Management
Retailing

School of Education

Education
Elementary Education

School of Engineering

Chemical Engineering
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering

School of Home Economics

Dietetic and Institutional Administration
Food and Nutrition in Business
Fashion in Retailing and Business
Nursery School Education
Secondary Education and Extension

School of Nursing

General Nursing

School of Physical Education

Physical Education for Men
Physical Education for Women
Recreation Leadership

Department of Public Health

Public Health

BOARD OF TRUSTEES

William Michael Cashin, A.B. (Boston College), Brighton 1963

Joseph P. Healey, A.B. (Harvard University), M.B.A. (Harvard Business School), LL.B. (Harvard Law School), Arlington 1963

Alden Chase Brett, B.S., LL.D. (University of Massachusetts), Belmont 1964

Ernest Hoftyzer, B.S. (Ohio State University), Marion 1964

J. John Fox, LL.B. (Boston University), Boston 1965

Miss Victoria Schuck, A.B., M.A., PH.D. (Stanford University), South Hadley 1965

Dennis Michael Crowley, B.S., M.S. (University of Massachusetts), LL.B. (Boston College), Boston 1966

Mrs. Kathryn Foran Furcolo (Elmira College), (Northeastern Law School), Chestnut Hill 1966

Frank Learoyd Boyden, A.B., A.M. (Amherst College), A.M. (Williams College, Yale University), SC.D. (Colgate University), PH.D. (New York State College for Teachers), LL.D. (Wesleyan University, Bowdoin College, Kenyon College, Harvard University, University of Massachusetts), L.H.D. (Amherst College, Williams College, Princeton University), LITT.D. (Tufts College), Deerfield 1967

George L. Pumphret, Dorchester 1967

Harry Dunlap Brown, B.S. (University of Massachusetts), Harbor Coves, North Chatham 1968

John William Haigis, Jr., B.A. (Amherst College), Greenfield 1968

Most Reverend Christopher Joseph Weldon, D.D., A.B. (St. Joseph's Seminary), (Montreal College), (Catholic University of America), J.U.D. (Holy Cross College), LL.D. (St. Michael's College, Boston College, St. Anselm's College), Springfield 1969

Philip Ferry Whitmore, B.S. (University of Massachusetts), Sunderland 1969

Members Ex Officio

His Excellency John A. Volpe, D. ENG. (Northeastern University), L.H.D. (St. Michael's College), Boston, *Governor of the Commonwealth.*

John William Lederle, A.B., A.M., LL.B., PH.D. (University of Michigan), *President of the University.*

Owen B. Kiernan, B.S. (Bridgewater State Teachers College), ED.M. (Boston University), ED.D. (Harvard University), *Commissioner of Education.*

Charles Henry McNamara, *Commissioner of Agriculture.*

Officers of the Board

His Excellency John A. Volpe, D. ENG. (Northeastern University), L.H.D. (St. Michael's College), Boston, *Governor of the Commonwealth.*

Frank Learoyd Boyden, A.B., A.M. (Amherst College), A.M. (Williams College, Yale University), SC.D. (Colgate University), PH.D. (New York State College for Teachers), LL.D. (Wesleyan University, Bowdoin College, Kenyon College, Harvard University, University of Massachusetts), L.H.D. (Amherst College, Williams College, Princeton University), LITT.D. (Tufts College), Deerfield, *Chairman.*

Kenneth William Johnson, B.S. (University of Vermont), Amherst, *Treasurer.*

General Information

The University of Massachusetts is the state university of the Commonwealth, founded in 1863 under provisions of the Morrill Land-Grant Act passed by the United States Congress one year earlier.

Presently observing its Centennial, the University is a member of the great community of Land-Grant colleges and state universities serving the nation as principal resources of higher education for the country's citizenry. Incorporated as the Massachusetts Agricultural College in April, 1863, the institution was formally opened to a handful of students in 1867. Rooted in the liberal arts tradition (its early presidents were graduates of such colleges as Dartmouth, Williams, Amherst, and Harvard), it has grown steadily from the four teachers and four wooden structures available for its opening session. Reflecting the broadening interests of its students, the General Court of Massachusetts authorized a second name, Massachusetts State College, in April, 1931. Sixteen years later, in May, 1947, the institution became the University of Massachusetts.

Situated in one of the most picturesque sections of the state, the University joins with its academic neighbors—Amherst, Smith, and Mount Holyoke Colleges—in maintaining the rich tradition of educational and cultural activity associated with this Connecticut Valley region. The University's central campus consists of approximately 700 acres of land and 80 buildings. Physical growth has been carefully planned, with provisions for additional buildings and facilities to accommodate an enrollment of approximately 10,000 students within the next decade. Offering a comprehensive program of instruction and research, the University is thus the Commonwealth's major resource of public higher education dedicated to the preservation and continued development of the country's free institutions.

BRANCHES OF INSTRUCTION

The Undergraduate College

The University offers four-year undergraduate instruction leading to the following degrees: Bachelor of Science, Bachelor of Arts, Bachelor of Science in Chemical, Civil, Electrical, Industrial and Mechanical Engineering, and Bachelor of Business Administration.

This instruction is assigned to the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing and

Physical Education. The aim of the four-year course is to give as high a degree of proficiency in some particular branch of learning as is possible without sacrificing the breadth, knowledge, and training which should characterize a well-rounded college education.

The Bachelor of Arts degree is conferred upon those candidates who fulfill the requirements for this degree specified by the College of Arts and Sciences and the School of Education. The Bachelor of Science degree is conferred upon those candidates who fulfill the requirements for this degree in the College of Arts and Sciences, the College of Agriculture, the Schools of Home Economics, Nursing, and Physical Education. All graduates from the School of Engineering receive the appropriate degrees of Bachelor of Science in Chemical Engineering, Civil Engineering, Electrical Engineering or Mechanical Engineering. All graduates from the School of Business Administration receive the degree of Bachelor of Business Administration.

Special arrangements are made for some graduates of county agricultural schools and of agricultural departments of certain high schools to complete the college course with majors in agriculture or horticulture. Upon the completion of their course they are granted a Bachelor of Vocational Agriculture degree.

The Graduate School

Graduate work leading to the Doctor of Philosophy degree may be taken in the following fields: Agronomy, Animal Science, Bacteriology, Botany, Chemistry, Economics, Entomology, Food Sciences, Food Technology, Government, Plant Pathology, Poultry Science, Psychology, Sociology, and Zoology.

A cooperative Ph.D. program involving Amherst, Mount Holyoke and Smith Colleges and the University of Massachusetts is also available in the biological sciences, chemistry and French.

The following departments offer major work leading to a Master's degree: Agricultural Economics, Agricultural Engineering, Agronomy, Bacteriology, Botany, Business Administration, Chemistry, Chemical Engineering, Civil Engineering, Dairy and Animal Science, Economics, Education, Electrical Engineering, English, Entomology and Plant Pathology, Floriculture, Food Technology, Forestry, Geology, German, Government, History, Home Economics, Horticulture, Landscape Architecture, Mathematics, Mechanical Engineering, Olericulture, Philosophy, Physics, Pomology, Poultry Science, Psychology, Public Health, Romance Languages, Sociology, Wildlife Management, Zoology.

The general requirements of the Graduate School regarding admission, residence, credits, tuition, etc., together with specific information concerning details of interest to prospective students,

are outlined in a separate bulletin, which may be obtained upon request from the Dean of the Graduate School.

Summer Sessions

An expanded summer program enables the student to earn nearly the equivalent of a full semester's work. The sessions are open to freshmen who wish to begin their college education immediately following graduation from high school. The program also serves the needs of students currently enrolled in colleges; graduate students; and professional workers seeking courses in specialized fields. A bulletin describing the entire summer program is available from the Director of the Summer Sessions.

The Stockbridge School of Agriculture

The Stockbridge School of Agriculture, founded in 1918, is part of the College of Agriculture. It is a two-year school and offers the associate degree in the following thirteen areas: Animal Science, Arboriculture, Dairy Technology, Floriculture, Food Distribution, Food Management, Fruit Growing, Landscape Operations, Poultry Science, Turf Management, Vegetable Crops, Vocational Forestry, and Wood Products.

High school graduates are eligible to apply, and there are no formal entrance tests. Preference is given to students with a good preparation in English, mathematics, and science. A particular effort is made to select applicants who have demonstrated a strong motivation in their major field of interest. On-the-job placement training is required of all students during the summer period between the first and second year.

The Stockbridge School issues its own catalogue and a copy may be obtained by writing to the Director of the Stockbridge School of Agriculture, University of Massachusetts, Amherst, Massachusetts.

Massachusetts Experiment Station

Making science useful for the benefit of all citizens and the improvement of the agricultural industry continues to be the primary responsibility of the Massachusetts Experiment Station established by the state legislature in 1887.

Basic scientific investigation is conducted to find satisfactory solutions to the problems involved in the production, processing and marketing of food and other agricultural products. A large part of the work of the staff centers around research in biochemistry, plant pathology, genetics, microbiology, soils, plant physiology, animal physiology and veterinary science, forestry, entomology and food technology.

Engineering research to develop new and improved methods and

techniques for the processing and marketing of food, flowers and nursery crops is an important part of the Experiment Station program.

Economic research is conducted to provide facts and figures upon which to base wise management decisions by individuals and firms involved in the broad agricultural industry. More and more attention is being given to the many problems involved in regional planning, land-use and wise development of natural resources for the benefit of industry, agriculture and local residents.

The science center (Field Station) at Waltham is a part of the Experiment Station established and maintained by the University to serve the people of the state through scientific investigation in the biological fields considered as "plant science." Problems involved in the genetics, culture, disease and pest control of flowers, vegetables and ornamental plants receive major emphasis. Similar research but directed at the specific problems of the cranberry industry is carried on at the Cranberry Research Station in East Wareham.

Public Service and Regulatory Activities

In addition to its research responsibilities the Experiment Station carries on many public service activities and administers statutory regulations pertaining to the sale of feeds, fertilizers, seeds and the use of milk testing glassware. These duties have been assigned by the state legislature to the Experiment Station which is equipped with the necessary laboratories and scientific personnel.

Cooperative Extension Service

The Massachusetts Extension Service conducts educational programs for adults and off-campus youth (4-H) in agriculture and home economics. These programs help people apply scientific and research information in reaching solutions to their problems. Programs are conducted with farm production, food processing, food distribution and other types of agricultural business, with homemakers and with other groups interested in family living, the development of youth, use of agricultural resources, and our rural communities.

The Extension Service is a cooperative teaching effort between the United States Department of Agriculture, University of Massachusetts and the several counties of the state. Many staff members in a wide range of fields at the University of Massachusetts participate in Extension education, as well as research and resident teaching. County Extension workers cooperate with University personnel in planning and conducting the work. A variety of educational techniques and communications media are used.

ADMISSION

Applications for admission may be obtained by writing the Registrar of the University. Candidates are advised to file their applications early in the senior year and certainly not later than March 1 of the year they plan to enter.

Qualified applicants are admitted at the beginning of the fall and spring semesters and at the beginning of the ten weeks summer session. Since there are many more qualified applicants than can be admitted, however, preference has to be given to those with the highest ratings.

All applicants for admission except veterans and candidates for the Bachelor of Vocational Agriculture degree must take the Scholastic Aptitude Test given by the College Entrance Examination Board. In addition, the University reserves the right to require three Achievement Tests administered by the same Board if the applicant's scholastic record includes several subjects below the college recommending grade of the school. Each applicant will be informed of the procedure he must follow at the time his application is acknowledged.

Methods

A. *High School Seniors*

High school seniors are advised to file their applications early in the senior year. The Scholastic Aptitude Test may be taken on any of the scheduled dates. The January date is recommended except for those applying for early acceptance. The May date is usually too late for seniors, but is appropriate for juniors taking the test for guidance purposes.

Some applicants have a definite first preference for the University and have records that deserve early consideration. Such applicants will be accepted early in their senior year under the following conditions. They must be taking the usual college preparatory course in high school and maintaining the college recommending grade of the school in all of their courses. They must take the College Board Scholastic Aptitude Test in the junior year, preferably in May, and make a score satisfactory to the University. They must indicate the University as their first preference.

Under these conditions the University will be glad to accept such students as indication of excellent achievement in high school and to reduce some of the anxiety that an applicant feels during the senior year while waiting for action usually taken in the spring. In this way, too, the burden of multiple applications on

high school principals and college admissions officers may be lessened.

B. *High Ranking High School Juniors*

Applicants who have completed with very high academic standing work through the junior year may be admitted to the University for the semester following the junior year. Such applicants must take the Scholastic Aptitude and three achievement tests given by the College Board in May of the junior year and make scores satisfactory to the University. They must be highly recommended by their high school principal. The maturity and social adjustment of the applicant will be considered along with his intellectual development. Such applicants should apply before the end of the junior year.

C. *Veterans*

Veterans are not required to take the Scholastic Aptitude Test. Instead, they must take entrance examinations in algebra, English and a College Qualification Test. These are administered by the University Testing Service in January, June and August. Information in regard to these tests will be furnished the veteran at the time he files his application for admission. "Six Months Active Duty for Training" students are not considered veterans. They must take the College Board Scholastic Aptitude Test rather than the Veterans' Examinations.

D. *Bachelor of Vocational Agriculture Degree*

Superior graduates of vocational schools of agriculture in Massachusetts and vocational agricultural departments in Massachusetts high schools may be accepted for the Degree of Bachelor of Vocational Agriculture, provided:

a. They are unqualifiedly recommended by the Vocational Division of the Department of Education as *bona fide* Vocational Graduates with superior ranks; and
b. That they can present at least 16 units of certified entrance credits, approved as to quality and quantity by the State Department of Vocational Education; and
c. That they successfully pass the English and College Qualification Test administered by the University Guidance Office. Those who have had algebra will be required to include the algebra examination.

E. *Transfer*

A limited number of transfers from approved colleges may be admitted. Since applicants for such transfer exceed the number that can be admitted, they are placed on a competitive basis.

Ratings will be based upon high school and college records and on the College Board Scholastic Aptitude Test, which is required of all transfers. The University reserves the right to require the College Board Achievement Tests also, if the applicant's records make such advisable. Information in regard to transfer may be obtained by writing the Registrar.

At least 45 semester credits taken in residence at the University are required of all transfers who are candidates for the Bachelor's Degree.

Subject Requirements

The subjects of preparatory study required for admission call for the satisfactory completion of a four-year high school course or its equivalent and are stated in terms of units. A unit is the equivalent of at least four recitations a week for a school year. High school graduation alone is not sufficient. The applicant's record must indicate capacity for handling the quality of scholastic work which the University has established as its standard of achievement.

Sixteen units of secondary school work must be offered, selected according to the following requirements:

College Preparatory Mathematics	3*
English	4
Foreign Language (2 years of 1 language)	2
U. S. History	1
Laboratory Science	1

The remaining units are elective and may be selected from the following subject matter:

a. Mathematics
b. Science
c. Foreign Language
d. History and Social Studies
e. Free electives (not more than four units)

Free elective subjects are those not included in groups a-d, as for example: Music, art, drawing, typewriting, aeronautics, agriculture, home economics, etc. Such free electives are allowed in order that the student who wishes may have some opportunity to elect other high school offerings, while at the same time covering the fundamental requirements for college work.

Students planning to major in the physical sciences and mathematics should, if possible, offer two years of algebra, one of plane geometry, and one-half year of trigonometry. Analytical or solid

* Preferably two years of Algebra and one of Plane Geometry.

geometry, chemistry, and physics, and an introduction to analytical geometry and calculus are also strongly recommended.

Students planning to pursue an engineering curriculum should offer two years of algebra, one of plane geometry, and one-half year each of trigonometry and solid geometry. Chemistry and physics are also advised. Those deficient in the mathematics should plan to cover it during the summer prior to entrance or expect to take five years to complete the college course.

In high schools organizing agricultural club work under the supervision and rules of the Junior Extension Service of the University, one credit is granted for each full year of work approved by state leaders.

Candidates of exceptional ability and promise may be considered for admission even though some of the prescribed courses were not included in their high school program.

College Entrance Examination Board Advanced Placement

Successful completion in secondary school of courses approved by the College Entrance Examination Board Advanced Placement Program, or the equivalent as approved by the University, will be regarded as meeting the equivalent requirement and will be accorded credit toward graduation.

Physical Examination

Physical examination by their local doctor is required of all entering freshmen, re-entering students and all students participating in athletics. Physical report forms for this examination will be mailed to each student with the bill for the first semester and must be completed and returned to the University Health Service 10 days before the opening of the semester. Evidence of a *successful* smallpox vaccination is required.

Financial Aid

Scholarships, loans, and part-time employment are available for a limited number of needy and deserving students. Freshmen are not eligible for part-time work the first semester.

A pamphlet on Financial Aid for Students at the University of Massachusetts is available upon request from the Placement and Financial Aid Services. See section on Placement and Financial Aid Services in this catalogue for further information.

Veterans' Affairs

The Veterans' Coordinator is a staff member of the Placement and Financial Aid Services. All veterans affairs should clear through the Placement and Financial Aid Services.

Veterans and eligible dependents of veterans who are entering the University for the first time must present a Certificate of Eligibility at registration. This may be obtained from your nearest Veterans Administration office. Board and room fees must be paid in advance whether the veteran is enrolled under the G.I. Bill or not.

Veterans who are transferring to the University of Massachusetts from another institution or who have done summer work at another institution will be required to submit a supplemental Certificate of Eligibility at registration. This may be obtained by applying through the veterans' office at the institution last attended.

EXPENSES

University Charges

Expenses vary from approximately $1000 to $1200 per year for the normally economical student. First year costs are usually greater than those of the other three years and there is less opportunity for earnings. Therefore, a student is advised to have a definite plan for meeting the expenses of the first year before entering.

The following estimate of a year's expenses, based chiefly upon last year's costs, includes only those items which are strictly college and does not include amounts for clothing, laundry, travel, etc. These costs vary slightly from year to year. Tuition for residents of Massachusetts is $200 per year and for others $600.

	Normal
Tuition (citizens of Massachusetts)	$200.00
Room in college dormitory or private home (approx.)	300.00
Board at college Dining Halls (approx.)	420.00*
Athletic Fee	30.00
Student Union Fee	20.00
Student Activity Tax (approx.)	28.00
Student Health Services Fee	30.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Books, stationery, and other supplies (estimate)	100.00
	$1144.00

Initial Payment for Freshmen

The initial payment for first semester expenses required of freshmen at the time of fall registration is indicated below and is made up of the following items:

Tuition (citizens of Massachusetts)	$100.00
Room rent in college dormitories (approx.)	150.00
Board at college Dining Halls (approx.)	210.00*
Athletic Fee	15.00
Student Union Fee	10.00
Student Activity Tax (approx.)	14.00
Student Health Services Fee	15.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Military uniform Deposit (men only)	30.00
Physical Education Equipment Fee (men only)	10.00
Books, stationery, and other supplies	100.00
	$670.00

*Above plan for 7 days; 5-day plan available for approximately $340.00 per year or $170.00 per semester.

The above are only approximate figures. A bill will be rendered to the parent of each student prior to the beginning of the semester.

Tuition

As a state institution the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

A student must present evidence satisfactory to the Treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a "bona fide" residence in the Commonwealth with the intention of continuing to maintain it as such.

The domicile of a minor shall follow that of the parents unless such minor has been emancipated. In case of emancipation the student, in addition to the requirements of these regulations, respecting residence, shall present satisfactory proof respecting emancipation. Minors under guardianship shall be required to present, in addition to the certification of the domicile of the guardian, satisfactory documentary evidence of the appointment of the guardian.

No student shall be considered to have gained residence by reason of his attendance in the University nor shall a student lose residential preference during his continuous attendance at the University.

The residence of a wife shall follow that of the husband.

The prescribed form of application for classification as to residence status must be executed by each student. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University.

Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University.

Students receiving credit by special examination must pay $5.00 per credit to be received before the examination may be taken.

Room Rent

The University provides accommodations in dormitories for a large number of its students. Freshmen, sophomores and juniors, unless 21 years of age, are required to live in University dormitories unless excused by the Dean's office.

Board

The University provides three dining halls for students at Butterfield House, Greenough House and University Dining Commons. The dining halls at Butterfield and Greenough dormitories are intended primarily to provide for students housed in that area, including residents of Chadbourne, Mills and Brooks Houses.

All freshmen, sophomores and juniors residing in University dormitories will be required to board at University dining halls, except that such students who are members of fraternities or sororities may be permitted to board at their respective fraternities or sororities.

Any student who wishes may board at University dining halls on the ticket plan or cash basis.

Athletic Fee

Funds received from this charge are used to support comprehensive men's and women's intercollegiate programs as well as fine intramural programs.

Student Union Fee

Funds received from this charge are used to support the Student Union and meet the operating costs of its various activities.

Student Activity Tax

This tax, authorized by vote of the undergraduate students with the approval of the Board of Trustees, provides each student with the "Collegian," the student newspaper; "Index," University yearbook; student government, class and other activities.

Health Services Fee

Funds received from this charge are used to support the medical, psychiatric and health services provided by the staff of the Infirmary.

Medical/Surgical Insurance

This is an *optional* plan intended to supplement the care received by students at the Infirmary. It provides hospital, medical, and surgical care on a twelve-month basis for injuries or illness during the school year, holidays, summer vacation and other times when the student is away from Amherst.

Married students may also provide for family coverage under the plan now in existence at the University.

Military Uniform Deposit

All male freshmen students taking military drill are required to make a deposit of $30.00 for the uniform at the time the first semester bill is paid. Charges for loss or damage of the government issued uniforms will be deducted from this deposit. Should the amount on deposit drop below $20.00, because of charges, the student will be required to make additional deposit to restore the balance to $30.00. The deposit will be refunded to the student less any charges after clearance from the Air Force or the Army after the student has completed the requirements of the basic course, has been excused from the course or has left the University.

Physical Education Equipment Fee

Income from this fee is used for the purchase of all clothing issued to male students for the use in the required physical education program, intramural athletics and general recreation.

Book, Stationery, and Supply Expenses

Students should be financially prepared to pay for necessary books and incidental supplies. Certain departments also make special charges for necessary laboratory supplies. Freshmen entering the School of Engineering should be prepared to meet an expense of approximately $45.00 for drawing equipment and slide rule.

Admission Payment

New students will be expected to make an advance payment of $15.00 to the Treasurer of the University as soon as they are notified by the Registrar that they are accepted for admission. This will be considered as first payment on University charges, which will be due at time of matriculation in September. It is not refundable and will be considered as payment for admissions and registration expense if the student does not matriculate.

A Certificate of Residence form furnished by the University must be properly filled out by the parent and the town or city clerk and returned with the $15.00 advance payment.

Summer Orientation Fee

Members of the incoming freshman class attending the summer orientation program will pay a non-refundable fee of $15.00 to cover the cost of meals, housing, testing and counseling.

Payment Due Dates

In accordance with University policy, all charges for tuition, fees, board and room rent in University Dormitories are due and payable twenty-one days prior to the date of registration of each semester. Bills will be rendered in advance and payment may best be made by mail. Students may not register until all University charges are paid.

Scholarship Payments

It is the responsibility of all scholarship holders to see that the University is notified prior to the time fee bills are prepared. Known scholarships are shown on the fee bills. If such items are not shown, deductions may not be made from the bill until satisfactory evidence has been presented to the University.

Late Payment and Registration

Any student who does not make payment of his semester charges by the date specified may be required to pay a fine of $5.00. Similarly, any student who does not report for registration or pre-registration on the dates specified or fails to complete his pre-registration within the prescribed time may be required to pay a late registration fee of $5.00.

The process of completing arrangements for housing according to schedules set forth by the University is to be considered a part of general registration procedures.

Tuition and Fee Refunds

A student who leaves the University for any reason except as specified below before a semester is completed will be granted a refund of tuition and fees in accordance with the following schedule:

Regular Term

a. Within the first two weeks from the beginning of semester or term—80%
b. During the third week—60%
c. During the fourth week—40%
d. During the fifth week—20%
e. After the fifth week—no refund

Summer Session

a. During the first week—60%
b. During the second week—20%
c. After the second week—no refund

A student who makes an advance payment and then for any reason does not attend any part of the next semester or term at the University will be given a full refund of tuition and fees. The $15.00 admission payment fee required of new students is not refundable.

A student who is involuntarily called into military service before the completion of a semester will be given a pro rata refund of tuition and fees provided that he receives no academic credit for the work of that semester. If academic credit is given, there will be no refund.

A student who is suspended or expelled from the University for disciplinary reasons forfeits all rights to a refund.

Room Rent Refunds

It is the policy of the University that there will be no refund of prepaid room rent after the semester has commenced except in the case of a student who is involuntarily called to military service and may be granted a refund on a pro rata basis.

A student who has made an advance payment of room rent who fails to attend any part of the next semester or term or does not reside in a dormitory or other housing will be granted a full refund of prepaid room rent.

Board Refunds

Prepaid board will be refunded on a special pro rata per diem basis.

PLACEMENT AND FINANCIAL AID SERVICES

The primary functions of the Placement and Financial Aid Services lie in vocational and financial counseling and the administration of the affairs involved in aiding students to seek appropriate positions and careers; the granting of loans and scholarships; the assignment of part-time work; the coordination of veterans' affairs; and the dissemination of information relative to military service through the draft or reserves.

Senior Placement

While providing vocational and career counseling for all undergraduates, the emphasis is on aid to seniors in planning their future following graduation and providing them with job-hunting techniques and other media for finding permanent employment. Actual contact with employers is provided during the year when employers from business, industry, schools, and other sources visit the campus to interview prospective graduates.

Cumulative student personnel records; occupational information and industrial literature libraries; preparation of credentials including personal resumes and recommendations coupled with counseling and guidance are provided to enable senior men and women to accomplish their career objectives consistent with their interests, abilities, aptitudes and education.

Financial Aid

(1) Part-time Employment

Part-time employment on campus is available although freshmen are not granted part-time work the first semester unless an extreme need prevails. Jobs in various categories, both on and off campus, are filled each year. All jobs are cleared through the Placement & Financial Aid Services. Wages vary according to the type of job and the student's past experience, but those allowed to work should plan to spend no more than ten to fifteen hours per week on such work. In order to give assistance to as many needy students as possible, the maximum wages earned are limited to the equivalent of board. The average earnings of students engaged in part-time work is approximately $200 per year.

(2) Loans

Several types of loans are available as follows:

University Loans

Through the generosity of friends of the University, funds have been donated to provide loans for a limited number of students of the three upper classes to assist in paying tuition or other college expenses. These loans are granted, after proper consideration, to needy students of good scholarship whose habits are economical. All loans are secured by a note endorsed by a responsible party as collateral. In general, if loans are taken out by a senior, they must be paid before graduation; otherwise they are due before the beginning of the next school year. Upon withdrawal from the University, loans automatically become due. On most of the funds, interest is charged at the rate of 3% to maturity and 5% thereafter. The Lotta M. Crabtree Agricultural Fund loans are made without interest. Application for loans should be made to the Placement and Financial Aid Services. No loan under this plan will be granted in excess of $200 in any one year.

If funds are available at the beginning of the second semester, loans may be made in exceptional cases to members of the freshman class whose scholastic record is satisfactory and whose budget calculations have been upset through circumstances beyond their control.

Higher Education Loan Plan

Loans up to $500 per year may also be obtained by students in the three upper classes from the bank of their choice through the Higher Education Loan Plan. Certification of attendance and other information relative to the student's over-all record will be submitted to the bank prior to receipt of the loan. Further information can be obtained through the Placement and Financial Aid Services.

National Defense Student Loan Program

Students may borrow up to $1000 per year under this program. Interest at 3% starts one year after completion of the program and is repayable within 10 years. Special consideration in the granting of these loans is given to needy students of superior scholarship who are majoring in engineering or a physical science, studying a modern foreign language, or planning to teach in a public school. Because of the small amount of money available, this is necessarily a limited, selective program. Further information and application forms may be secured from the Placement and Financial Aid Services.

Special Financial Aid for Graduates Interested in Farming

The Lotta M. Crabtree Agricultural Funds make available to graduates of the University of Massachusetts funds to be used for farm financing.

The purpose of loans from these funds is to assist meritorious graduates who are without means in establishing themselves in agricultural pursuits. These loans are made without interest or service charges other than the cost of title search and legal papers. They must, however, be paid back in full amount within a reasonable length of time and there are certain restrictions on their use.

Applications for the "Lotta Crabtree Agricultural Fund" should be addressed to the Trustees of the Lotta M. Crabtree Estate, 619 Washington Street, Boston, Massachusetts, or may be secured at the Placement and Financial Aid Services Office at the University. Decisions regarding the granting of a loan rest entirely with the Trustees under the terms of Miss Crabtree's will.

Veterans and Veterans' Dependents Benefits

Veterans or dependents of veterans eligible for education and training under the Disabled Veterans Bill 894, the Korean Veterans Bill 550, or the War Orphan Bill 634 should present a Certificate of Eligibility at registration. Monthly attendance reports to assure payment of benefits are cleared through the Placement & Financial Aid Services. A staff member of these services coordinates all veteran affairs and stands ready to assist you in the appropriate clearance and liaison with the Veterans Administration for receipt of your benefits and allowances.

Military Service Information

The Office of Placement and Financial Aid Services also provides information concerning draft status and military reserve duty. Students who reach draft age (18) may register through this office, which notifies the local draft board. Information is transmitted to local draft boards continuously concerning the status of individual students. Attempt is also made to keep abreast of military reserve affairs and to aid students who have questions in this regard.

Scholarships

Scholarships are awarded only to needy and deserving students of high character whose habits are economical and whose scholastic records are satisfactory; that is, at least a 2.5 quality point average. A limited number of scholarships are available to entering freshmen who have made outstanding records in high school.

Scholarships are paid in installments at the beginning of each semester in the form of a credit on the student's bill. A scholarship may be discontinued at the close of any semester.

If the scholarship student withdraws from the University, any refund of University fees or charges must first be applied to reim-

burse the scholarship fund for the full amount of the scholarship received by the student for the semester.

Applications for scholarships may be obtained from the Placement & Financial Aid Services and must be completed and returntd by March 1 to be considered.

GENERAL SCHOLARSHIPS

Commonwealth Scholarships. The Commonwealth of Massachusetts annually provides 25 scholarships of not more than $250 for members of each of the four undergraduate classes of the University. Upperclass students may obtain application forms from the Placement & Financial Aid Services. Entering freshmen may obtain application forms at the Registrar's Office.

Alpha Sigma Phi Scholarship for needy students.

Danforth Keyes Bangs Scholarship for the aid of industrious and deserving students.

Lucius Clapp Fund to provide scholarships and loans to deserving students.

Foreign Student Scholarships. A limited number of scholarships, involving waiver of tuition fees only, awarded on basis of merit and need. Applications should be addressed to the Adviser to Foreign Students.

Henry Gassett Scholarship for a worthy undergraduate student.

Charles A. Gleason Scholarships. General Scholarship for worthy students.

Whiting Street Scholarship. Scholarships of $50 each for deserving students.

University Associate Alumni Scholarships. A limited number of scholarships awarded on the basis of leadership, need, scholarship and participation in extracurricular activities.

University Foundation Scholarships. A limited number awarded to needy scholars.

University Scholarships. Scholarships ranging in value from $50 to $500 awarded to needy scholars in all the colleges, schools, and divisions except Agriculture.

RESTRICTED SCHOLARSHIPS

George H. Barber Scholarship and Grant-in-Aid Awards. A limited number of scholarships or grants-in-aid based on evidence of outstanding athletic performance and good citizenship, need or high scholarship.

Class of 1882 Scholarship for the aid of a worthy student of the junior or senior class.

Frederick G. Crane Scholarships for the aid of worthy undergraduate students, preference given to residents of Berkshire County.

Stephen Davis Scholarship. Estabished by gift of Mr. and Mrs. Benjamin Davis of New York City in memory of their son, Stephen Davis, class of 1954, who lost his life while serving as an officer with the United States Air Force. For a male undergraduate majoring in Liberal Arts or Social Sciences who has participated in the athletic program. The selection of the recipient is made jointly by the Dean of the College of Arts and Sciences and by the Dean of the School of Physical Education. The student selected receives each year, not to exceed four years, the full income from the fund so long as he remains in good standing in the University and continues to major in Liberal Arts or the Social Sciences. Annual income is approximately $800.

Interfraternity Council Scholarship. A $100 scholarship awarded annually to a member of one of the social fraternities. The recipient must show evidence of need. In addition, he must have a record of participation in extracurricular activities and have at least a 2.5 quality point average.

National Food Brokers Association Scholarship. $250 to be awarded to either an undergraduate or graduate student who is interested in making a career in the food industry.

Betsey C. Pinkerton Scholarships. Two general scholarships for graduates of the schools in the city of Worcester.

Sigma Xi Scholarship Award. The Massachusetts Chapter of the Society of the Sigma Xi makes an award of $100 annually to an undergraduate student at the University in recognition of a developing research interest in the sciences or engineering.

Wilbur H. H. Ward Scholarships. Twenty-five scholarships of approximately $100, known as the Wilbur H. H. Ward Scholarships. The Ward Fund is administered by a Board of Trustees independent of the University. Applicants for these scholarships write to Allen S. Leland, Stockbridge Hall, University of Massachusetts, Amherst. They are available to Hampshire County men.

College of Agriculture

Alvord. For students specializing in the study of Dairy Husbandry or Dairy Manufacturing with the intention of becoming an investigator, teacher, or special practitioner in the dairy industry. Restricted to students who do not use tobacco or fermented beverages.

O. G. Anderson Memorial Fund. For needy and worthy students majoring in pomology. To be used for the purchase of books and supplies. Granted only on the recommendation of the Department of Pomology.

Ascension Farm. For men students in the College of Agriculture. Residents of Berkshire County have preference, but awards may be made to students from Hampshire, Hampden, and Franklin Counties.

Berkshire County Farm Bureau Scholarship. The Berkshire County Farm Bureau is sponsor of a scholarship awarded yearly to a Berkshire County boy or girl as a means of assisting him or her to obtain a college education.

Boston Market Gardeners' Association. A $100 scholarship for a Sophomore in agriculture. Applications should be made to the Secretary of the Boston Market Gardeners' Association, 240 Beaver Street, Waltham 54, Massachusetts.

Boston Stewards Club. Scholarships to students majoring in Food Management. Awards are made on basis of both financial need and scholastic attainment.

Buttrick. For junior, senior, or graduate students majoring in Dairy Industry or Food Technology. Scholarships will range from $100 to $500 per year depending upon scholarship achievement and need.

H. B. Cantor Foundation Scholarship. A $500 scholarship for students majoring in hotel and food management. Students must be recommended by the University Scholarship Committee. This scholarship may be awarded to either a four-year or a Stockbridge School of Agriculture student.

Charles M. Cox Trust Fund Scholarship of $300 is awarded to a student or students in the College of Agriculture on the basis of need, character and scholarship ability. Preferably the scholarships will be awarded to undergraduate majors in dairy husbandry or poultry husbandry.

Lotta M. Crabtree. For students in the College of Agriculture. Based on scholarship and need.

J. W. D. French Fund. For students in dairy and forestry, and allied subjects.

Hampshire County Farm Bureau Scholarship. The Hampshire County Farm Bureau is sponsor of a scholarship awarded yearly to a Hampshire County boy or girl as a means of assisting him or her to obtain a college education.

Charles H. Hood Foundation. Awarded to two students in the

College of Agriculture, with preference given to those studying the production of milk. Based on scholastic standing, character, industry, and personality.

Massachusetts Flower Growers' Association Scholarships. Two $200 scholarships awarded to qualified juniors or seniors majoring in Floriculture.

Margaret Motley. For a woman student majoring in Floriculture or Landscape Gardening. Need, scholarship, and promise of success form the basis of the award which is provided by the Garden Club Federation of Massachusetts, Inc.

Porter L. Newton. For students majoring in Agriculture who are residents of Middlesex County.

Frank H. Plumb. For students majoring in the College of Agriculture.

Ralston Purina. A $500 Scholarship for a student majoring in Animal Science or Poultry Science.

V. A. Rice Scholarship Fund. A $100 scholarship for a worthy student majoring in Animal Husbandry.

Sears, Roebuck Foundation. Four scholarships for outstanding freshmen in the College of Agriculture, based on scholarship, leadership, personality, business ability, or special achievement. The outstanding freshman recipient is eligible for a special sophomore scholarship.

Springfield Garden Club. For students living in the vicinity of Springfield, Mass., and majoring in some phase of Horticulture.

Ellsworth Milton Statler Foundation Scholarships. Two $500 scholarships for students majoring in Hotel and Food Management. Students must be recommended by the University Scholarship Committee and approved by a Committee of the Statler Foundation. These scholarships may be awarded to either four-year or Stockbridge students.

George Treadwell. A $100 scholarship given by Worcester County Poultry Association to a needy and worthy student from Massachusetts who is majoring in Poultry Husbandry at the Stockbridge School of Agriculture.

School of Engineering Scholarships

Alumni Scholarships. Provided by annual contributions from graduates and friends of the School of Engineering to provide scholarships to deserving and well qualified students pursuing work in

a major field of engineering. They are available to freshmen and upperclassmen.

Kollmorgen Optical Corporation Tuition Scholarship. Awarded annually to a junior or senior student majoring in mechanical engineering. Awarded on the basis of need and superior scholastic attainment.

Western Massachusetts Section, American Society of Mechanical Engineers. Awarded annually to a junior or senior mechanical engineering student who is a legal resident of the area represented by the section. Awarded on the basis of need and scholastic attainment.

Military Scholarships

United States Army ROTC Scholarship. The U. S. Army Reserve Officers Training Corps offers one or more scholarships to selected members of ROTC.

United States Air Force ROTC Scholarship. The U. S. Air Force Reserve Officers Training Corps offers one or more scholarships to selected members of AFROTC.

College of Arts and Sciences

Richard W. Fessenden Memorial Scholarship. An award made to undergraduate students majoring in chemistry upon the recommendation of the department of chemistry. This award is made possible by donations from friends and former students of Dr. Fessenden, former professor of chemistry at the University.

Massachusetts City Managers' Association Scholarship. Tuition scholarship awarded by committee composed of the President of the City Managers' Association, the head of the department of government and the Director of the Bureau of Government Research, to an undergraduate or graduate student majoring in government.

Public Health Scholarships

Massachusetts Department of Public Health Scholarship. A scholarship in the amount of $300 made to an outstanding student in the field of bacteriology and public health.

Massachusetts Association of Sanitarians Scholarship. A scholarship in the amount of $100 made to an outstanding student interested in the general field of public health.

Massachusetts Milk Inspectors' Association. One or more scholarships, each in the amount of $100, made to outstanding students interested in the field of sanitation or milk sanitation.

Public Health Service Traineeship for graduates and undergraduates, one or more annually, complete expenses paid as a stipend.

William B. Palmer Scholarship for juniors and seniors majoring in Sanitary Science or Public Health, $300 annually (The International Association of Milk and Food Sanitarians).

School of Home Economics

Berkshire County Women's Advisory Council Scholarship. For a student majoring in Home Economics who is a resident of Berkshire County. Preference may be given to applicants who have indicated an interest in Extension work as a career.

Minnie R. Dwight Scholarship. For a student majoring in Home Economics who is a resident of Hampden County. This scholarship is awarded for four years if scholarship is maintained.

Mrs. Clifton Johnson Scholarship. For one or more Home Economics students who are residents of Hampshire County. Preference may be given to applicants who have indicated an interest in Extension work as a career.

Helen Knowlton Award and Scholarships. The award is for the highest ranking senior Home Economics student. Scholarships are for other deserving Home Economics students.

Massachusetts Home Demonstration Council Scholarship. For a Home Economics student at Framingham State Teachers College or the University of Massachusetts.

Sears, Roebuck Scholarships. For two freshmen students entering the School of Home Economics from small town or rural high schools, and preferably those who have indicated an interest in Extension work.

Mildred Thomas Scholarship. For a student majoring in Home Economics at Regis, Simmons, State College in Framingham, or the University of Massachusetts. The applicant must be a resident of Worcester County and have completed the Freshman year.

Helen A. Whittier Award. For a senior Home Economics student selected on basis of scholarship, need, and character.

4-H Scholarships

Cotting Memorial Scholarship. All college expenses of freshman year—for a woman student. Recipient of this scholarship is selected by a committee of the New England Branch of the Farm and Garden Association from among candidates proposed by State Leaders of 4-H Club work in the New England states.

Esso Scholarship. This scholarship of $800 is awarded to a freshman enrolled in the College of Agriculture. The recipient receives $200 during each of the four years he is enrolled. Applications for this scholarship must be submitted to the State 4-H Club Leader.

George L. Farley Scholarships. The Massachusetts Society for Promoting Agriculture has established a scholarship in memory of George L. Farley. The income of approximately $60 per semester is awarded to deserving 4-H Club members, men or women, recommended by the State Leader of 4-H Clubs from applications submitted by County 4-H Club Agents.

Scholarships for Women Students Only

Chi Omega Award. The local chapter of the Chi Omega Sorority offers an annual scholarship of $25 to a woman student majoring in the department of economics or psychology who has the highest scholastic average at the end of the first semester of the senior year.

Greater Springfield Panhellenic Association Award. This award is given each spring for use in the sophomore, junior, or senior year to a woman student from Western Massachusetts. The award is based on scholarship and need, character and evidence of leadership in campus activities.

Polish Junior League Scholarship. An award by the Polish Junior League to a woman student of Polish descent, at the end of her junior year, paying full tuition for the senior year. The basis of this award is character and scholastic achievement.

UNIVERSITY REGULATIONS

Freshman Orientation Program

Members of the incoming freshman class are required to attend a summer orientation program of two and a half days. This is a period of testing, counseling and pre-registration. A series of guidance and placement tests will be given and then scored. The student will be assigned to a faculty counselor who will help him select his courses for the fall semester and plan his schedule of hours.

If a student is given advanced placement by a placement examination or by some other means, and if he completes the advanced work (the next course if the courses are in sequence) with a grade of C or better, he will be given credit toward graduation but no grade for the omitted work; if the grade in the advanced work is D, he will be considered to have completed any requirement represented by the omitted work but will not receive credit for the omitted work. Credit with no grade awarded in this manner will be treated as transfer credit in the computation of quality-point averages.

A special program for parents is arranged for the final day of the session at which time they learn about the tests and the results, the student's proposed courses and schedule for fall semester, and the facilities and opportunities at the University.

Enrollment Regulations

A. Pre-Registration

Every student must report for pre-registration on the appointed day. Late pre-registrations will be charged a fee of $5. A student who does not pre-register is not assured admission into the next semester.

B. Registration

Each student must report for registration on the appointed day. Late registrants must pay a $5 fine.

C. Course Changes

No course will be recorded on the permanent records of the Univeristy nor will a student receive credit for it unless he has registered for such a course in accordance with established procedure on a regularly scheduled registration day or unless his registration shall have been made official by the signature of the Registrar. In the latter case a Program Change Card must be signed by the student's adviser and the Registrar approving the course, and by the instruc-

tors of the courses to be dropped and added. No instructor should allow a student to enter his class unless the student was officially enrolled on a regularly scheduled registration day or submits such a Program Change Card authorizing his admission to the class.

A student may not drop a course without the approval of his adviser and the Registrar on a Program Change Card and the release of the instructor. A course dropped without this approval will be recorded as a Failure.

D. Adding or Dropping Courses

No new course may be added to a student's schedule after ten calendar days from the first scheduled classes of the semester. A course added without the recommendation of the adviser and Registrar on a Program Change Card will not receive credit. Cards are available in the Registrar's Office.

A student may withdraw from a course without its being recorded on his permanent record provided he does so within ten calendar days from the date of the first scheduled classes of the semester. A student may withdraw from a course after this ten day period but within 28 calendar days from the date of the first scheduled classes of each semester with a mark of "W", withdrawn, recorded on his permanent record. A "W" does not affect the student's quality point average—it serves only to indicate attendance beyond the ten day limit.

Any course dropped after 28 calendar days from the day of first scheduled classes of the semester is recorded by WF, withdrew failing. This grade will be computed in the quality point average. An exception may be made to this rule if because of protracted illness or serious family problems it becomes necessary to reduce the course load but only in case the student is passing the course at the time it is dropped. In such a case a mark of WP is recorded. This is not computed in the quality point average. The instructor must certify that the student is passing at the time the course is dropped and both adviser and Provost must approve the reason for dropping before the WP can be allowed. An overload of courses is not considered grounds for dropping under this arrangement.

The minimum load that can be approved for any student is 12 semester hours. A student is not allowed to reduce his credits below this minimum either by W or WP without the permission of his adviser and the Provost.

A course dropped any time without the approval of the adviser and Registrar on a Program Change Card will be recorded as a failure.

E. Withdrawals

If a student voluntarily withdraws from the University after the announced closing date for submission of mid-semester grades, each course for which he is registered will be recorded on his permanent record as WF or WP in accordance with his standing in the course at the time of formal withdrawals.

F. Credit by Special Examination

The requirements of any course approved for credit may be met by examination upon arrangement with the Dean of the School or College and the head of the department offering the course, provided the student's quality point average is 2.5 or higher. All such arrangements must be completed prior to the mid-semester. No student may earn more than thirty (30) semester hours of credit in this manner.

Advisory System

In order that from the day he enrolls the freshman may have someone to whom he may go for consultation and assistance, each student selects a tentative educational objective and is assigned a faculty adviser within that academic area. It is the function of this adviser to help the student in adjusting himself to the work and life of the University. Academic progress reports issued by the Registrar's Office are sent to the advisers periodically, and the students are expected to report to their advisers from time to time to discuss their academic standing. The University also forwards reports of academic standing to the parents. Both students and parents are encouraged to consult with the adviser whenever there are problems regarding studies or personal adjustments to college life.

In the second semester of the freshman year, each student is given an opportunity to change to a new department or to remain in his current department. In succeeding semesters, students may change to another major department by execution of a Program Change Card (available in the Registrar's Office).

Student Housing

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in campus dormitories and be required to eat at University dining halls unless given permission to commute from their parents' home or to live at sorority or fraternity houses. University board is optional for seniors and is available on a cash basis. Sororities and fraternities may furnish regular board to members up to the approved capacity for each house.

Students who are assigned to housing operated by the University are expected to remain in occupancy for the academic year and may not be released sooner except as their places are taken by suitable substitutes.

The University of Massachusetts reserves the right to change room assignments whenever necessary.

Most dormitory rooms are double and are furnished with beds, mattresses, desks, chairs, and a chest of drawers. Students care for their own rooms and are responsible for any damage.

Dormitories will be open for occupancy on the day immediately preceding the opening of the University.

All student property must be removed from the rooms and the key turned in immediately after final examinations in June. Such property not removed by the owner will be removed by the University and stored at the owner's expense.

Students assigned to dormitory rooms will be responsible for the room rent of the entire semester. Room rent is not refundable.

Room rental charges do not include the several regular school vacation periods. The University reserves the right to utilize student rooms during vacations for conferences and other groups which meet occasionally on the campus.

Rooms for Men Students

Dormitory rooms are available for male students at Baker, Butterfield, Chadbourne, Greenough, Hills, Mills, Van Meter, and Wheeler Houses. Two new dormitories will be ready for occupancy in the Fall of 1962.

Assignment of rooms in men's dormitories is under the supervision of the Housing Office. Requests for permission to live off campus must be made in writing to the Dean of Men.

A full-time Head of Residence who is a member of the professional staff of the Dean of Men's Office is in charge of each dormitory. While these Heads of Residence are responsible for the enforcement of University rules and regulations, their primary concern is to counsel students. In each dormitory they are assisted by Floor Counselors in maintaining good living and study habits.

Dormitories are governed by an elected Student House Council, advised by the Head of Residence, a procedure which gives the students valuable training in dealing with the problems of group living.

Rooms for Women Students

Assignments of rooms in women's dormitories are made by the Office of the Dean of Women. Rooms are available for women stu-

dents at Abigail Adams, Arnold, Brooks, Crabtree, Dwight, Hamlin, Johnson, Knowlton, Leach, Lewis, Mary Lyon, and Thatcher Houses.

Under the supervision of the Dean of Women, life in each dormitory is directed by a council of student leaders, advised by a full time head of residence, so that conditions in the residence halls are conducive to study and good living habits. Through the women's branch of the Student Government, the responsibility is put upon each student to live according to her own best standards as well as according to the standards of the group.

Freshman girls will be assigned rooms in the dormitory and will be notified of the assignment prior to the beginning of college.

In the spring of each year, upperclass women have an opportunity to choose rooms for the coming year.

Only students living in their own homes may commute. Upperclass women may apply to the Dean of Women for permission to live in a sorority house, or to earn room and board in a private home.

Dormitories are maintained for undergraduates; graduate women from other countries are also accommodated whenever possible. The Dean of Women's Office maintains a list of rooms in Amherst available for graduate women students.

Apartments for Married Students

The University owns and operates two groups of apartments; Lincoln Apartments for junior faculty, graduate and undergraduate students, and County Circle apartments for graduate and undergraduate students. Apartments are unfurnished with the exception of kitchen units which contain an electric range and refrigerator.

Apartments are assigned as of date of availability. New junior faculty, married graduate students and undergraduate students with children receive consideration in that order.

Further information and applications may be obtained from the University Housing Office, Draper Hall.

Every effort will be made to assist applicants in obtaining housing either on or off campus. Listings of off campus housing are available at the Housing Office. Due to daily changes in these listings and the fact that all off campus arrangements must be made by the parties involved these listings cannot be given out except on a personal visit.

Automobiles

Only members of the senior class, students 21 years old or over, and commuters are permitted to have automobiles or other types

of automotive equipment on the campus or in the Town of Amherst. Vehicles must be registered with the Campus Police. Driving to and from classes is not permitted. Exceptions may be made in the case of an individual who has a severe physical limitation. Requests for such exceptions must be made through the University Health Service.

GRADING SYSTEM

Enrollment in and graduation from the University involve both quality and quantity of work. The quantity of work is measured by the credits obtained by successful completion of courses. The quality of work is measured by grades. Each grade is equated with a quality point as noted below. The quality point average required for continued enrollment and for graduation is set for each class by the Faculty Senate. A cumulative average of 1.70 is required for graduation for the classes of 1962 and 1963. Beginning with the class of 1964 the graduation requirement is a cumulative average of 1.80.

I. Grades

Grades shall be reported according to the following letter system. No other interpretation of this letter system shall be authorized.

A — Excellent
B — Good
C — Average
D — Passing (but not satisfactory)
F — Failure
Inc. — Incomplete

The grade of Incomplete shall be reported:

A. When a portion of the assigned or required class work has not been completed because of necessary absence of the student, or other reasons equally satisfactory to the instructor. And then only when he considers the work already done to be of passing quality.

B. When because of serious illness or other cause beyond the control of the student, he is unable to take the final examination. In this case an *Incomplete* is to be given only if the instructor judges that the quality of the student's work is such that by satisfactory performance in the examination he could complete the work of the course with a passing grade. If the student's record is such that he would fail the course regardless of the result of the examination, he is to be given a failure.

A student can obtain credit for an *Incomplete* only by finishing the work of the course before the end of the fourth week of his next semester. A mark of *Incomplete* will be automatically converted to a failure if the course requirement has not been satisfied by this time. The initiative in arranging for the removal of the *Incomplete* rests with the student.

II. Quality Points

A. Quality points per semester hour will be assigned as follows: A, 4; B, 3; C, 2; D, 1; F, 0.

B. *Semester Grade Point Average.* To compute the semester grade point average, the total points earned will be divided by the total credits carried. Credits carried are defined as total credits earned and failed. Grade point averages will be recorded to one decimal place. For example, averages from 2.65 to 2.74 will be recorded as 2.7. At the end of the senior year, the cumulative average will be recorded to two decimal places. A student with an Inc. will not have his semester quality point average computed until these marks have been converted to letters except in those cases where obvious dismissal would be involved regardless of the *Incomplete.*

C. *Cumulative Average.* To compute the cumulative grade point average, the total points earned will be divided by total credits carried. Total credits carried will be the sum of the total credits earned and failed. A course once passed cannot be repeated for a higher grade.

D. In computing grade point averages the following will not be included:

1. Required physical education courses of the freshman and sophomore years.
2. Courses for which a student does not receive credit toward a college degree (Mathematics or Foreign Language to satisfy an entrance deficiency).

E. Only grades earned at the University will be included in computing the Cumulative Quality Point Average.

F. *Warning.* Any student whose semester quality point average falls below the cumulative quality point average requirement of his class will be warned of his status by the Registrar and informed of the rules governing dismissal. A copy will be sent to his parent.

Change of Major

A student wishing to change his major must get a Major Change Card at the Registrar's Office. This change is to be approved by the head of the Department or School in which he is now majoring and also by his new major adviser. This card, properly endorsed, must be returned to the Registrar's Office before the change receives final approval.

Standards of Conduct

The customary high standard of college men and women in honor, self-respect, and consideration for the rights of others constitutes the ideal of student conduct.

The privileges of the University may be withdrawn from any student at any time if such action is deemed advisable.

It should be understood that the University, acting through its president or any administrative officer designated by him, distinctly reserves the right, not only to suspend or dismiss students, but also to name conditions under which they may remain in the institution.

Hazing in the sense of the punishment or humiliation of students is not permitted.

Dismissal

Dismissal from the University for scholastic reasons shall be based upon regulations to be administered by the Committee on Admissions and Records. Changes in these regulations may be made by the Faculty Senate and the University faculty.

Honors

A. *University Honors Groups.* At the beginning of each semester a list is posted of those students who, during the previous semester, made a semester grade point average of 3.0 or higher. Three groups are recognized as follows:

First Honors	3.8 or higher
Second Honors	3.4 to 3.7 inclusive
Third Honors	3.0 to 3.3 inclusive

B. *Graduation with Distinction.* High ranking students will be graduated as follows:

Summa Cum Laude—Cumulative average 3.8 or higher.
Magna Cum Laude—Cumulative average 3.4-3.7 inclusive.
Cum Laude—Cumulative average 3.0-3.3 inclusive.

A transfer, to be eligible for consideration for graduation with distinction, must have earned his final 60 semester hours of credit in residence at the University.

Graduation Requirements

All four-year curricula of the University conform to the following basic conditions:

A. The successful completion of at least 120 semester hours of academic credit. These are exclusive of basic Military and Air Science courses required of men students and the basic physical education courses required of all students. Individual colleges, schools, divisions and departments may require more than 120 semester hours of academic credit.

B. An introduction to the basic skills of communication by successful completion of English 1 and 2 and Speech 3.

C. An introduction to the humanities by the successful completion of English 25 and 26 and of one other semester course of three hours of academic credit chosen from art, English, foreign-language literature, music and philosophy courses.

D. An introduction to the development of Western culture and of the modern social sciences gained through the successful completion of nine semester hours of credit in courses chosen from the offerings of at least two of the following departments: economics, history, government, psychology, and sociology.

E. An introduction to mathematics and natural sciences to be achieved by the successful completion of 12 semester hours of credit in courses chosen from the offerings of at least two of the following three broad academic divisions: mathematics, biological sciences and physical sciences.

F. Intensive or specialized work in a particular department, division, school or college constituting a major and consisting of the successful completion of at least 15 semester hours of credit in junior-senior courses in the area of the major.

G. It is the policy of the University that the final year's scholastic work be accomplished in residence, which is defined for this purpose as continuous enrollment and regular attendance in classes conducted on the campus of the University. This requirement may be waived by the Board of Admissions and Records upon the recommendations of the major department and Dean of the College or School.

The Board may also waive the requirement for a student admitted to an appropriate professional school after completion of six or more semesters of work at the University, provided:

1. That the cumulative average at the University has been 2.5 or higher.
2. That satisfactory evidence is presented indicating completion of work comparable to that offered at the University in amount sufficient to satisfy requirements for the appropriate bachelor's degree.
3. That the major department and Dean of the College or School approve.

H. No student is allowed more than ten semesters, including semesters at other colleges, to attain the required graduation average. Twelve semester credits earned in summer schools at the University or other colleges constitute a semester.

A student who has met the required graduation average but is deficient in course requirements may continue for one additional semester (total 11).

Financial Requirements for Graduation

Diplomas, transcripts of record, and letters of honorable dismissal will be withheld from all students who have not paid all bills and all loans due the University. All such bills due the University must be paid ten days preceding Commencement. If paid after that date and the student is otherwise eligible, he may graduate the following year.

Transcripts

Two transcripts of a student's record will be furnished without cost. For each additional copy there will be a charge of $1.

GENERAL SERVICES

University Library

The University Library now consists of the Goodell Library built in 1935 together with a new library addition of seven floors completed in September 1959 which is twice the size of the original library building. The library complex will provide space for the future expansion of the book collection to 460,000 volumes. Seating capacity is provided for 1350 readers and includes special study areas and reading rooms.

The present book collection numbers 239,819 volumes in the University Library and the 30 departmental and laboratory libraries. Facilities in the University Library include rooms for reference materials and current periodicals, a rare book room, an extensive microfilm collection, microfilm reading units, a map room, an exhibition area, and a typing room for researchers. The University Library is also a depository for the publications of the United States Government as well as the State Agricultural Experiment Stations.

Hampshire Inter-Library Center

The University Library is a participating member of the Hampshire Inter-Library Center, a cooperative facility for the acquisition, storage and servicing of research materials, especially journals, documents and reference sets. Incorporated in 1951 to augment library resources in the area, HILC is jointly operated by the four Connecticut Valley colleges—Amherst, Mount Holyoke, Smith, and the University of Massachusetts. The collection numbers more than 18,000 volumes. It is located on the second level of the new addition to the University Library.

Religious Activities

The University is concerned in an age of anxiety with the needs for spiritual undergirdings for the educated man. In this day of uncertainty, such concern for the affairs of the spirit has an equal prominence with searching for scientific truths and knowledge in human relations.

The University gives support to the religious life of its students in various ways. It affords the use of University facilities for student groups of all faiths. It cooperates with the official agencies of the three faiths most largely represented at the University by recogniz-

ing the contributions of their privately supported chaplains and by giving them facilities and privileges for their work.

On the campus, the religious life of Catholic students is enriched by the program of the Newman Club, of which Rev. David J. Power is chaplain and Rev. J. Joseph Quigley is assistant chaplain. Jewish students participate in services and activities sponsored by the B'nai B'rith Hillel Foundation, of which Rabbi Louis Ruchames is the director. Protestant students join in worship, study, and service planned by the Christian Association, with the guidance of Rev. Albert L. Seely, Protestant chaplain and several denominational Associates.

Other religious groups such as the Inter-Varsity Christian Fellowship, the Orthodox Club, the Christian Science Organization, and the Lutheran Club also meet regularly on campus and students interested in their programs are welcome to attend. The Campus Religious Council provides a cooperative inter-relationship among the campus religious groups and serves the whole University community by sponsoring the Annual Blood Drive, book and clothing drives, and the Religious Handbook for Freshmen.

The local Protestant and Catholic churches of Amherst provide opportunities for Sunday worship, and Sabbath services for Jewish students on Friday evenings are held at the Student Union. Students are encouraged to attend the services of their respective faiths. Several denominations sponsor active student programs centered in the local churches as well, and students are welcome to attend events and join groups sponsored by the denominations.

Health Service

The Health Service is devoted to the promotion of optimum health among members of the University Community. Its concern is for the total health of individuals and groups, as reflected in the need for complete physical, mental, and social well-being.

An expansion of the work of the Health Service has been made possible with the opening of the new Infirmary in the fall of 1961. The building contains an out-patient department with offices and examining facilities for adequate care of ambulatory patients. In addition, there are 88 beds available for care of students whose needs are best met by hospitalization. X-ray, laboratory, and physiotherapy facilities are available to help in reducing time lost by students for reasons of health.

Recognition of the specific emotional needs of students in an educational environment has led to the provision of an active psychiatric program, and diagnostic and limited treatment consultations are available. Orthopedic and radiological consultants are available regularly; other consultation services can be arranged

as the need arises. Hospitalization for conditions requiring more specialized care than is available in the Infirmary can be arranged at the Cooley-Dickinson Hospital in Northampton.

The Health Service works closely with the School of Physical Education in adapting the facilities of the School to the individual needs of students for restricted or remedial activity. The health status of participants in the athletic program, both intramural and intercollegiate, is under Health Service supervision; and care is always available for any injuries resulting from these activities.

The Health Service also has an active concern for matters of sanitation and safety which affect the health of students, faculty, employees, and visitors. A physician is always on duty at the Infirmary, or on call, to attend emergency needs among families, visitors, and members of conference groups as well as regular members of the University community.

Students are urged to consult a member of the Health Service staff as soon as any indication of a physical or emotional disorder is evident. It is much easier for the staff, and less time-consuming for the student, to rectify minor difficulties before they have become sources of disability.

Students who are under medical supervision prior to entrance are urged to have their physicians write the Health Service, giving reports and instructions in appropriate detail. Every effort is made to continue treatment without interruption. In brief, the Health Service attempts to provide all students with a co-ordinated and comprehensive program of health supervision formerly provided by their family physicians.

Speech and Hearing Center

A Speech and Hearing Center is maintained to assist students with speech and hearing problems. Professional services are provided by qualified speech and hearing therapists. Opportunity for assistance is available for students with various problems including stuttering, articulation problems, foreign dialect, voice disorders, and hearing loss. Interested students may contact the Speech Department for an appointment. Appointments will also be made for students recommended by advisors and faculty members. There is no fee for services.

Publications and News Office

The University recognizes its obligation to provide the public with accurate information about its educational program. With rising public interest in higher education, news of the University

is sought by all communications media, including the daily and weekly press, radio and television.

In addition to providing information through mass media, the Publications and News Office maintains contracts with institutions of higher learning throughout the country through exchange of information in professional journals and publications of educational societies.

Daily training in news writing is provided for a limited number of students who report on University activities and prepare copy for general news releases.

The catalogues describing various phases of the academic program of the University are edited in the Publications and News Office.

Audio-Visual Center

The Audio-Visual Center is organized to help the professional staff through the use of audio-visual materials. The Center has a library of about 1,000 motion picture films; filmstrips; and 2 x 2 slide sets. All major types of audio-visual machines are available for short-term use in classroom teaching. The Center maintains a photographic service for the preparation of technical pictures and 2 x 2 slides. Assistance is available in the preparation of instructional graphic materials, such as charts, graphs, maps and diagrams.

Office of Institutional Studies

The Office of Institutional Studies is established to collate materials and information on the University of Massachusetts and institutions of higher education in general. It will provide a library of published information on higher education, including studies done at other institutions. It will serve as a clearing house for information on our own institutional growth and development. It will undertake to assist faculty and administration in the continuing analysis of our institutional practices.

The Massachusetts Population Research Institute

The Massachusetts Population Research Institute, established in September, 1961 by the Department of Sociology and Anthropology, has a twofold purpose: (1) to serve as a center for the analysis of the structure of and changes in contemporary Massachusetts population; and (2) to provide training for undergraduate and graduate students in the techniques of demographic analysis. The Institute publishes a series of working papers on the major aspects of Massachusetts demographic structure.

Bureau of Government Research

The Bureau of Government Research was established at the University of Massachusetts in 1955. The Bureau is staffed by professional personnel experienced in local government research. Its work consists of research in governmental problems, publication of studies in public administration, conducting training institutes for public officials, providing consultative services to cities and towns, and the maintenance of a research library.

Alumni Association

The Associate Alumni is the general alumni organization of the University of Massachusetts. The association maintains headquarters at Memorial Hall, erected by alumni and friends in honor of those men of the University who died in World War I.

The association publishes a magazine, *The Massachusetts Alumnus,* as the alumni publication of the University.

According to its by-laws, the corporation is constituted for the purpose of promoting the general usefulness of the University of Massachusetts; of cultivating among its graduates and former students a sentiment of mutual regard; and of strengthening their attachment to their Alma Mater.

Under sponsorship of the University of Massachusetts Building Association, composed of alumni who volunteered their services, 19 dormitories, two faculty apartment centers, and a Student Union Building have been constructed on the campus.

The governing body of the Associate Alumni consists of its officers and a board of directors. Four directors are elected each year and serve a term of four years. All graduating seniors become members of, and contributors to, the association at graduation, according to a tradition set by the Class of 1940.

The Student Union

The Student Union is the community center for all members of the University family—students, faculty, administration, alumni, and guests. It is not just a building: it is an organization and a program which together constitute a well-defined plan for a fruitful community life on campus.

Constructed in 1957 by the University of Massachusetts Building Association, the Union is the center not only of major social activities, but also of many other organized endeavors forming an important adjunct program in the general educational process of the University as a whole.

Thus, the Union houses the offices of the Coordinator of Student

Activities, R.S.O. Financial Advisor, student publications, the Chaplains, the University Conference Coordinator, and the Student Senate. Service departments of the Union include: the University Store, carrying a complete stock of books & student supplies, and other items; the Union Food Service, providing snacks & lunches or catered meals; the Games Area, with bowling, billiards, table tennis and other table games; the six-chair Barber Shop; and the Lobby Counter, the Union's general service facility (newspaper stand, box office, check-cashing service, record lending library, and information desk).

Three large lounges—the Cape Cod, Colonial, and Governor's—are available for reading and conversation. There is also a Music Room, for listening or piano practice; a Reading Room, containing home-town newspapers and periodicals; and ten Meeting Rooms for use by campus organizations.

Extra-curricular activities are selected, planned and executed by the Student Union Program committees. These groups are composed of interested volunteer students, and their activities are coordinated by a full-time Program Coordinator.

The construction cost of the Student Union is being defrayed by a Student Union Fee of $10 per student per semester. The excess of student fees over the bond schedule, plus revenue earnings, compose the operating fund for the Union building.

SPECIAL PROGRAMS

Distinguished Lectureships, Seminars, Colloquia

Each year the University brings distinguished personages to the campus to lecture on topics of major significance in the arts, sciences, public affairs, and other areas of human concern. Each talk is given either as a single public lecture or as part of a program of panel discussions and lectures sponsored by a University group for public presentation. Included in the yearly schedule of such events are the Alumni War Memorial Lectures; the University of Massachusetts Assembly lectures and seminars; public lectures of the University's Distinguished Professors of Public Affairs; panel discussions and talks delivered during International Weekend; and the Phi Kappa Phi and Sigma Xi lectures. In addition, individual departments sponsor continuing programs of extra-curricular lectures, seminars and colloquia for the benefit of majors in those departments as well as for other interested persons.

Recognizing that a comprehensive education is not sustained through curricular experience alone, the University urges all of its students to attend as many of the extra-curricular lectures as they possibly can. Students undertaking honors work or participating in the Dean's Scholars program are informed of forthcoming lectures through an Honors Council newsletter. The student body at large is kept informed of such events through notices in the college newspaper as well as through posters, class announcements, and other means. The entire program is directed towards giving students fresh perspectives and a broader experience than that afforded by the University curriculum alone.

Four College Cooperation

Amherst, Mount Holyoke, and Smith Colleges and the University of Massachusetts have for some time combined their academic activities in certain selected areas for purposes of extending and enriching their collective educational resources. Under this cooperative program, a student in any one of the four institutions may enroll in courses given at the other three if he has the necessary qualifications and the approval of the Dean or Provost of his own institution.

Catalogues of the courses offered at the other institutions are at the loan desk in each library and in the offices of all chairmen of departments. Application blanks and transportation information are available at the University in the Office of the Provost. Requests

are usually made for advanced courses in the student's major subject and are normally granted only to students in good standing.

The oldest and perhaps most important of the Four College cooperative ventures is the Hampshire Inter-Library Center, a separate legal entity with a Board of Directors composed of the four Presidents, the four Librarians, and representatives from each of the Faculties. HILC is a depository for research materials and learned periodicals of a kind and in a quantity well beyond the reach of any one of the four libraries operating independently. The Center is now located on the University campus in the new addition to Goodell Library.

An FM radio station, WFCR (88.5), is similarly a Four College activity, operating as a legal entity under a Board of Directors made up of representatives of the four institutions. Other cooperative activities, all designed to give added strength in one way or another to each institution, include: a joint astronomy department; new courses in the history of science; new courses in non-Western studies, financed for three years by the Ford Foundation; a Ph.D. program; a Film Center; a common calendar of lectures and concerts on all four campuses; and a committee on transportation. Additional cooperative projects are in the planning stage. The entire program is under the supervision of a Coordinator who is a member of the administration of all four institutions.

New England Regional Program

The University participates in a cooperative program conducted by the six New England state universities under auspices of the New England Board of Higher Education. Under this program, a student wishing to pursue studies in a major field not offered at his own state university may attend another New England state university at the in-state tuition rate. Information about the program is available in the Office of the Provost.

Humanities Center for Liberal Education

The offices of the executive director of the American Humanities Center for Liberal Education are maintained in South College. This is a national agency fostering strengthened relationships between the liberal arts and sciences and the world of affairs and action.

The American Humanities Seminar, under the auspices of the University and the Center, is held annually on campus. It seeks to strengthen cooperation among the liberal arts and sciences and the technological fields.

PROGRAM FOR SUPERIOR STUDENTS

The University provides superior students with challenging educational opportunities beyond those normally encountered in the regular four-year curricula. A flexible program of honors work, intended to develop and expand the potential of academically gifted students, is offered in the following areas.

Early Admission

The University will consider applications for admission to the freshman class from students of high standing who have completed their junior year of secondary school and who qualify by letters of recommendation, examinations, and personal interview.

Advanced Placement

The University grants advanced standing and college credit to entering students who have successfully completed certain college-level courses in their secondary schools as a part of the College Entrance Examination Board Advanced Placement Program or an equivalent. The University also administers a number of advanced placement tests to entering students enabling them to be placed in more advanced courses. Upon obtaining satisfactory standing in many of these courses, students will be granted academic credit for the courses bypassed.

Waiver of Requirements and Prerequisites

For students who, through tests, can prove proficiency in the skills and subject matter of the course to be waived.

Credit by Examination

Up to thirty semester hours of credit may be granted students of high standing who can fulfill the requirements of some of their courses through independent study.

Freshman, Sophomore, and Junior Honors Colloquia

Honors Colloquia provide students of outstanding talent an opportunity to work in small inter-disciplinary groups of ten students and two professors from all colleges and departments of the University. Reading lists of widely-selected materials and discussion em-

phasize breadth of learning, the ability to make significant personal investigations, to communicate ideas effectively orally and in writing, and to defend these under critical examination of the group. Each student works under close supervision of the two instructors. To provide an extension of the student's viewpoints in areas other than his own, and to expand the scope of his work rather than emphasize intensive study of one field, as is done in senior honors, assigned readings treat topics of broad, central concern which cut across several disciplines and fields, demonstrate the unity of knowledge, and lend experience in intellectual inquiry, analysis, and synthesis. Several academic privileges are accorded Honors Colloquia members, and one credit per semester is granted.

Senior Departmental Honors

Departmental Honors are designed to recognize merit and give highly qualified students time and opportunity for independent study under closer, more personal direction than is ordinarily provided in the University curriculum. Such study shall be devoted to a careful exploration of some question, problem or theme of significance within the student's major field. The ultimate aim of Departmental Honors is to afford talented students maximum freedom to develop their powers of initiative and resourcefulness and greater freedom to make at least a beginning in original, contributive research. To be eligible for admission to Departmental Honors, a student should have a scholastic record of 3.0 or higher for the first five semesters of college work and demonstrate outstanding promise in his major field. In exceptional cases students who have averages lower than 3.0 but show unusual aptitude for independent work may be accepted if a written statement establishing this is presented to the Director of Honors. Departmental Honors candidates are assigned an advisor who supervises the preparation of the thesis to be submitted to his department and to the Honors Council. The candidate also presents an oral defense of his thesis. If by the excellence of his work he satisfies all the requirements of his department and the Honors Council, the candidate is awarded honors in the field of his specialization upon graduation. During the senior year, independent study is carried forward each semester as a three-credit course in the department of the major. Senior Honors students have the privilege of enrolling in courses normally limited to graduate students. By permission of the head of the department of their major, Senior Honors students may gain admission to the Graduate School of the University and enroll in courses for graduate credit, provided requirements for the baccalaureate are separately fulfilled.

Further Opportunities for Independent Study

Students majoring in the College of Arts and Sciences who have a cumulative quality point average of 3.0 or better may, upon the recommendation of their major department, the Honors Council, and the approval of the Dean, pursue special courses of study during the senior year. The program must be the equivalent of thirty semester hours of credit, and students electing such programs will be granted release from other formal requirements of the senior year.

STUDENT ORGANIZATIONS

Participation in extra-curricular activities offers opportunities to further the broader objectives of a college experience. The knowledge, skills and judgment developed in the classroom can be tested and refined through use in the organizational setting. Thus, more than fifty professional clubs exist on campus as a means of stimulating vocational interest through close contact with members of the teaching staff and representatives of the professions. Student government offers a forum for debate on matters of importance to the entire University community. For those interested in communications, there are several campus publications as well as an FM radio station. Experience in music and drama is available in a number of forms.

Such activities can be a profitable means of fostering maturity and general enrichment in those students who wish to take optimum advantage of all that the University can offer. In encouraging participation in these activities, the University asks only that students plan their time well, in order that they may profit as much as possible from a total University program devoted, first and foremost, to academic studies.

All extra-curricular activities are supervised by the Committee on Recognized Student Organizations composed of alumni, faculty, and students. Recognition for outstanding achievement in this area is given at an annual Student Leaders Night held in the spring. An office devoted to administering and assisting in the conduct of student activities is located in the Student Union. Detailed information about student organizations may be obtained by contacting the Recognized Student Organizations Advisor.

Student Government

The Student Senate, operating under a student approved Constitution, has vested in it all legislative functions of student government and has the primary goal of promoting the welfare of the entire student body. The Senate levies student taxes and appropriates money for many student activities and services. At the same time, the Senate acts as the official representative of the students both on and off the campus. In coordination with the Dean of Men and the Dean of Women, the Senate has the responsibility of establishing effective rules guiding the activities of students at the University.

Campus Publications

The Collegian. Tri-weekly newspaper published by undergraduates.

Index. The University yearbook.

The Literary Magazine. Magazine for the publication of literary and artistic efforts of undergraduates.

Ya Hoo. Campus humor magazine, published three times a year.

Engineering Journal. Quarterly open to science and engineering students for the publication of technical articles and essays of general interest.

Dramatics

The Roister Doisters. The University's drama club, the Roister Doisters, is open to all four-year students interested in any phase of the art of the theater. Regular performances of major plays gives members excellent opportunities for gaining experience in acting, production techniques, and other aspects of dramatic presentation.

University Music Organizations

Campus music organizations provide experience in musical and allied activities for performers and technicians with various kinds of intestest and ability. Membership is open to all students, faculty, alumni, and others in the area community.

Bands. The University Bands program offers opportunity to virtually all interested students to participate in one of the member units. The *Concert Band* is a symphonic group of qualified wind instrumentalists. The *Redmen Band* performs during the football season at all home and some away games. The *Varsity Pep Band* plays for basketball games. The *Dance Band* performs at campus dances and concerts. The *Precisionettes* are a 48-girl drill team active during the football season.

Chorale. The University's choral group rehearses notable works for presentation on campus and on tour. Smaller choral ensembles are trained for special musical events.

Operetta Guild. The Guild produces standard works from the repertoire of American musical theater. Membership is open to persons interested in an art form which provides experience in many elements of musical performance as well as in staging, acting, and other theater activities. The Guild sponsors an Opera Workshop each year as well as miniature musical theater groups.

Concert Association. The Association offers students an opportunity to stage professional concerts and recitals and to administer

a large-scale annual enterprise involving major financial and promotional concern. The Association each year presents distinguished attractions including national symphony orchestras, outstanding operatic performers, instrumental virtuosi, and other offerings.

Professional Clubs

Numerous professional clubs, established in connection with the various major courses of study, stimulate students' professional interest in their chosen fields and afford opportunity for discussion of technical subjects of mutual interest.

Among the special-interest groups are the Debating, Flying, Parachute, Equestrian, Ski, Water Ski, and Outing clubs.

Student Honor and Service Societies

Adelphia. The men's senior honor society brings together the most representative men in college who are leaders in various branches of student activity. In recognizing men who have attained a high standard of leadership in college activities, the society strives to preserve valuable traditions and customs and to advance the University of Massachusetts in all ways. Membership is limited to a total of 20 men from the senior and junior classes.

Mortar Board. The Isogon Chapter of Mortar Board was installed at the University of Massachusetts in 1955. The purpose of the Society is to promote college loyalty, to advance the spirit of service and fellowship among University women, to maintain a high standard of scholarship, to recognize and encourage leadership, and to stimulate and develop a fine type of college woman. Membership is composed of a total of not less than five or more than 25 girls from the senior class selected on the basis of service, scholarship, and leadership.

Maroon Key. The men's sophomore honorary-service society, composed of 25 students recognized for leadership abilities and University services.

Scrolls. Women's sophomore honorary-service society, composed of 20 students elected at the end of the freshman year.

Alpha Phi Omega. A fraternity which renders various kinds of service to the University. The group is composed of former members of the Boy Scouts of America.

Service Organization

Revelers. A group of upperclassmen chosen to promote and encourage freshman interest and participation in campus activities.

Fraternities and Sororities

Social fraternities on the campus include Alpha Epsilon Pi, Alpha Gamma Rho, Alpha Sigma Phi, Kappa Sigma, Lambda Chi Alpha, Phi Mu Delta, Phi Sigma Delta, Phi Sigma Kappa, Q.T.V., Sigma Alpha Epsilon, Sigma Phi Epsilon, Tau Epsilon Phi, Tau Kappa Epsilon, Theta Chi, Zeta Nu. An Inter-Fraternity Council, consisting of representatives of these fraternities, has charge of rushing and all general matters dealing with fraternity life. A cooperative organization—The Fraternity Managers' Association—pools the financial resources of all fourteen fraternities for purposes of effecting orderly, economical purchasing and accounting procedures. A professional Fraternity Manager, with offices in South College, administers the Association's program.

Sororities include Alpha Chi Omega, Chi Omega, Kappa Alpha Theta, Kappa Kappa Gamma, Lambda Delta Phi, Pi Beta Phi, Sigma Delta Tau, and Sigma Kappa. The Panhellenic Council, made up of representatives from the sororities, supervises rushing and other sorority matters.

Intercollegiate and Intramural Athletics

The University believes there are educational advantages in a well-organized intercollegiate and intramural sports program. In intercollegiate athletics, the University is represented by teams in all the leading sports, including football, soccer, cross-country, basketball, swimming, wrestling, indoor and outdoor track, hockey, rifle and pistol, baseball, tennis, golf, lacrosse, gymnastics, skiing.

The University also supports a broad program of intramural activities, in which all students are encouraged to participate. The range of sports available each year includes the team sports of touch football, basketball, softball, volleyball. Individual activities include tennis, bowling, badminton and golf.

The University Intercollegiate Athletic Program is supervised by the University Athletic Council and is composed of the following members: five faculty members appointed by the President, three alumni representatives appointed by the Directors of the Alumni Association, the Executive Director of the Alumni Association, and ex officio, the Director of Athletics.

The University of Massachusetts is a member of the Yankee Conference, the National Collegiate Athletic Association, the Eastern College Athletic Conference, the Association of New England Colleges for Conference on Athletics, and the Intercollegiate Athletic Association.

HONORS, PRIZES, AWARDS

Academic Honor Societies

Phi Kappa Phi. The Honor Society of Phi Kappa Phi is a national organization, and has been represented on this campus since 1904. Its primary objective is the recognition and encouragement of superior scholarship in all fields of study. Good character is an essential supporting attribute. The Massachusetts chapter elects undergraduates in either their junior or senior years. Members of the Faculty and graduate students are also eligible for election.

Sigma Xi. The Society of the Sigma Xi is the national honor society whose objective is the encouragement of original investigation in science, pure and applied. Since 1938, a chapter of the Society has been active on the campus of the University. The Chapter may elect to associate membership undergraduate students who have shown marked excellence in the study of recognized fields of the sciences and engineering. Election to full membership is accorded those who have clearly demonstrated ability to pursue independent scientific research. The Chapter sponsors a program of public lectures and a number of awards designed to foster the objectives of the Society.

Sigma Gamma Epsilon. The Beta Theta chapter of the Sigma Gamma Epsilon Fraternity was installed at the University of Massachusetts in 1951. The purpose of the fraternity is to stimulate scholastic, scientific, and social advancement of students of the earth sciences in universities and scientific schools with recognized standings in the United States and Canada. Membership is open to men majoring in geology, mining, metallurgy, ceramics, petroleum engineering, or other branches of earth sciences, who meet the requirements of the fraternity.

Omicron Nu. The Alpha Pi chapter of the Society of Omicron Nu was installed on the campus in 1952. The purpose of the society is to recognize superior scholarship and to promote leadership and research in home economics. Membership is open to juniors and seniors majoring in home economics who meet the requirements of the society.

Phi Tau Sigma. Phi Tau Sigma Honorary Society is the international honor society for food science. It was founded at the University of Massachusetts in 1953, and its executive headquarters are permanently located here. Its purpose is to encourage and recognize achievement in food science. Senior students from all

departments related to food science are eligible for election to membership if they meet scholastic and character requirements of the University Chapter.

Tau Beta Pi. The Massachusetts Zeta Chapter of Tau Beta Pi was installed on campus in the fall of 1955. The society exists for the purpose of honoring engineering students of high scholarship, character, and interest in campus activities. Senior and junior students in the School of Engineering are eligible for election to membership if they meet the requirements.

Beta Gamma Sigma. The Gamma Chapter of the University of Massachusetts was installed in 1959. The purposes of the Society are to encourage and reward scholarship and accomplishment among students in commerce and business administration; to promote the advancement of education in the art and science of business; and to foster integrity in the conduct of business operations.

Alpha Lambda Delta. The Scholastic Honor Society for Freshman Women was installed at the University of Massachusetts as a chapter of Alpha Lambda Delta, national honor society, in 1960. The purpose is to promote intelligent living and to encourage superior scholastic attainment among freshman women. Members are students who achieve averages of 3.5 or above in the first semester or in cumulative average at the end of the first year of college.

Phi Eta Sigma. The Society of Phi Eta Sigma was installed on the campus in 1955. The purpose of the society is to recognize outstanding scholastic achievement by freshman men and to encourage a higher standard of learning among all freshmen. Honorary membership is granted those faculty members who are most effective in encouraging students in the attainment of these goals.

(Student honor and service societies—those recognizing leadership in extra-curricular activities as well as scholastic attainment—are listed under Student Organizations, beginning on Page 57. These include, among others, the senior men's and women's honor societies, Adelphia and Mortar Board.)

Scholastic Prizes

PHI KAPPA PHI AWARDS FOR SCHOLARSHIP. The University of Massachusetts chapter of Phi Kappa Phi, national all-university scholastic honor society, annually presents substantial monetary awards to the outstanding scholar or scholars of each of the three upper classes. These awards, based upon cumulative scholastic averages and character, are presented at the Honors Banquet in the spring.

The Burnham Prizes. These were made possible through the generosity of Mr. T. O. H. P. Burnham of Boston. Prizes of $25 and $15 are awarded through the Department of Speech to those students delivering the best and second best oral interpretation of literature in the Burnham Contest. Preliminary contests are open under certain conditions to freshmen and sophomores.

The Flint Prizes. The Flint Speaking Contest was established in 1881 by a gift of the late Charles L. Flint, a former president of the College. After his death the prizes were continued by college appropriation. Awards of $25 and $15 are presented through the Department of Speech as first and second prizes respectively to those two upperclassmen delivering the best extemporaneous speeches in the contest.

Hills Botanical Prize. This is given through the generosity of Henry F. and Leonard M. Hills of Amherst for the first and second best herbaria. Competition is open to members of the senior, junior and sophomore classes. First prize is $20, second prize $15.

Massachusetts Association of Real Estate Boards. $100 for that student doing the best work in the course in Real Estate in the School of Business Administration.

Massachusetts Society for Promoting Agriculture Prizes. Three prizes of $25, $15, and $10 are awarded to those senior students who are judged to have made the best record in a speaking contest held early in May.

National Food Brokers Association Scholarship. $250 to be awarded to either an undergraduate or graduate student from the Department of Marketing (School of Business Administration) who is interested in making a career in the food industry.

Sigma Xi Scholarship Award. The Massachusetts Chapter of the Society of the Sigma Xi makes an award of $100 annually to an undergraduate student at the University in recognition of a developing research interest in the sciences or engineering.

Betty Steinbugler Prize In English. This prize was endowed by John L. Steinbugler, New York City, in honor of his daughter, Elizabeth Steinbugler Robertson, a graduate of this University in 1929. It is awarded to a woman in the junior or senior class who has written the best long paper on a subject of literary investigation in a course in English during the year.

L. R. Wilson Award In Geology. This award, named in honor of the former head of the Geology Department, is conferred on the

graduating senior with an outstanding academic record as a major in geology.

Athletic Awards

Chester F. Bowen Jr. Memorial Award. The class of 1949 presented the Chester F. Bowen Jr. Memorial Award in track and cross-country to the University as its class gift. Members of the class felt that this gift would be the most appropriate which they could give the University, since it would be a fitting memorial to a former classmate and a worthy award for the outstanding athlete in varsity track and cross-country.

Samuel S. Crossman Memorial Trophy. This award is made to the member of the senior class who must have received two varsity awards, had an above average academic record, and possessed qualities of enthusiasm, cooperation, leadership, and be recognized as the outstanding student-athlete on the campus. The trophy was established by the University Athletic Council. The award is dedicated to the memory of Samuel S. Crossman and consists of a trophy upon which the name of the student chosen is to be inscribed. A small replica will be presented for his permanent possession.

L. L. Derby Award. This plaque is presented by the Alumni Varsity M Club each year at its Commencement meeting to that member of the track team who is considered to have been the most valuable member of the team during the past season.

Eastern College Athletic Conference Award. This award is designed to signalize and honor the student whose combined record of academic and athletic activity at each Conference member college. The E.C.A.C. is composed of 114 colleges and universities located in the eastern section of the United States.

The William T. Evans Memorial Trophy. This trophy is given each year to that member of the varsity football team who through his sportsmanship, football ability, character and personality, has exemplified the character and spirit of the person in whose memory this memorial trophy is dedicated. The trophy is dedicated to the memory of William T. Evans, a former member of the class of 1942, who died December 9, 1941. This trophy is presented annually by the class of 1942.

Golf Award. Presented to the most valuable member of the Gold Team as chosen by the lettermen of the squad.

Gymnastics Cup. Awarded to the most valuable member of the Gymnastic Team.

HOCKEY AWARD. This plaque shall be awarded annually at the Commencement meeting of the Varsity Club, to that member of the hockey team who is considered to have been the most valuable player to the team.

THE JOSEPH LOJKO MEMORIAL PLAQUE. This plaque is presented to a senior who must be a letter man, have a satisfactory scholastic record and show those qualities of enthusiasm and cooperation which make for leadership. It is awarded in honor of Joseph Lojko of the Class of 1934, outstanding athlete who died while a senior in the College.

MANAGER OF THE YEAR AWARD. The Athletic Association awards a gold plaque to that varsity sports manager who had demonstrated initiative and proficiency in managerial duties.

PISTOL MEDAL. Awarded on a point basis to a member of the varsity team.

THE ALLAN LEON POND MEMORIAL MEDAL. This medal is awarded for general excellence in football in memory of Allan Leon Pond of the class of 1920, who died February 26, 1920. He is described as "A congenial companion, a devoted lover of Alma Mater, a veteran of World War I, a fine all-around athlete and a true amateur. He would rather win than lose, but he would rather play fair than win." He has been characterized as a typical student of the University.

RIFLE AWARD. Awarded on a point basis to the outstanding member of the varsity rifle team.

PAUL SEARS PUTNAM MEMORIAL TENNIS TROPHY. This trophy is awarded to that member of the varsity tennis team who has displayed by his conscientious endeavor, clean play, good sportsmanship and all-around ability as an athlete and scholar, that he is a credit to his team and University, and shall have his name inscribed on the trophy. He shall also be presented with a suitable medal or watch charm. The trophy is established in memory of Paul Sears Putnam, '38, by the members of his family, in the hope that it will stimulate and encourage students to emulate his characteristics of whole-hearted enthusiasm and good sportsmanship, true cooperation and the constant endeavor to always give to the best of their ability in any project they may undertake.

GEORGE HENRY RICHARDS MEMORIAL CUP. This cup is awarded annually to the member of the basketball team who shows the greatest improvement in leadership, sportsmanship, and individual and team play during the year. It is in memory of George Henry Richards of the Class of 1921 who died suddenly while a student at the College.

Samuel B. Samuels Basketball Cup. This cup is presented annually in the name of Samuel B. Samuels of the Class of 1925 who was an outstanding basketball player during the early years of basketball as a varsity sport at the University. The trophy is awarded to that letterman who is a regular member of the varsity team and who has performed with excellence during scheduled varsity games.

Maurice Suher Soccer Plaque. This trophy is to be awarded annually to that letterman of the varsity team who is deemed to have been the most valuable member of the team. It is presented to the University by Maurice Suher of the class of 1930, who was one of the two students largely instrumental in having soccer recognized as a varsity sport at the University. He played on the first varsity soccer team at the University of Massachusetts, in the fall of 1929.

Sports Dad Award. The Sports Dad Association was formed in 1958 and consists of fathers of all varsity athletes. This association awards three trophies to outstanding athletes for scholastic achievement and athletic excellence.

Swimming Trophy. Awarded to the most valuable member of the varsity swimming team.

E. Joseph Thompson Memorial Trophy. This baseball trophy is given by Thomas Thompson in memory of his brother, E. Joseph Thompson who graduated from Massachusetts State College in 1932. He was president of the Student Senate, a varsity letter man in football and baseball, and an outstanding campus citizen. The award goes to that member of the varsity baseball team who best exemplifies the most admirable characteristics of the sport each year.

Wrestling Trophy. Awarded to the most valuable member of the varsity wrestling team.

MILITARY AND AIR SCIENCE HONORS AND AWARDS

Leadership, scholarship, and proficiency in the work of the Military and Air Science departments are recognized by honors and awards announced at the Annual Spring Review in May.

Department of Military Science

Distinguished Military Students. Each year the Professor of Military Science designates as distinguished military students those members of the first year advanced course who possess out-

standing qualities of leadership, high moral character, and a definite aptitude for the military service. Students who are so designated must possess an academic standing in the upper half of their class or in the upper ten per cent of their class in military subjects. All distinguished military students are authorized to wear the distinguished military student badge.

Distinguished Military Graduates. Each year the Professor of Military Science designates as distinguished military graduates those members of the graduating class who were previously designated as distinguished military students and have maintained the same high standards required for such designation and have successfully completed training at the Reserve Officers' Training Camp.

U. S. Armor Association Scroll. Awarded by the U. S. Armor Association to the outstanding Armor cadet graduating from the senior ROTC class. An engraved scroll bearing the name of the winner is presented to the winning cadet to keep in his personal possession.

Armed Forces Communications Association Honor Award. Awarded by the Armed Forces Communications Association to the outstanding senior ROTC cadet majoring in electrical engineering. The winner is presented with an appropriately engraved gold medal and scroll.

Military Science Faculty Award. Awarded by the Military Science faculty to the Cadet Colonel of the Armored Combat Command for outstanding leadership. The winner is presented a complete set of officers' insignia.

Reserve Officers Association Award. Awarded by the Reserve Officers Association of the United States, Massachusetts Department, to the Junior Armor cadet who is outstanding in military proficiency. The winner's name is engraved on a plaque. A medal, appropriately engraved and a complete set of officers' insignia is given to the individual to keep in his personal possession.

Elizabeth L. McNamara Trophy. Awarded by Mrs. Elizabeth L. McNamara, a former trustee of the University of Massachusetts for many years, to the Armor cadet ranking first in scholarship in the second year basic course. The winner's name is engraved on a plaque and a sterling silver goblet, appropriately engraved, is given to the individual to keep in his permanent possession.

Military Science Award. Awarded by the Department of Military Science, University of Massachusetts, to the Armor cadet ranking first in the first year advance course. The winner's name is en-

graved on a sterling silver goblet which is given to the individual to keep in his permanent possession.

Amherst Rotary Club Trophy. Awarded by the Amherst Rotary Club to the Armor cadet ranking first in scholarship in the first year basic course. The winner's name is engraved on a plaque and a sterling silver goblet, appropriately engraved, is presented to the winner to keep in his personal possession.

Military Science Award. Awarded annually by the Department of Military Science, University of Massachusetts, to the Armor cadet ranking first in military proficiency in the first year basic course. The winner's name is engraved on a sterling silver goblet which is given to him.

Department of the Army Awards. The Department of the Army awards annually the Superior Cadet Ribbon with certificate and lapel device, to one outstanding student in each academic class. The winner of the award must be in the upper one fourth of his academic class and be selected by the PMS and Dean of Men.

The John C. Hall Trophy. Awarded annually to the second year basic course student who ranks number one in military proficiency. The winner's name is engraved on a loving cup which is of permanent nature and maintained in the military offices. A cordial type sterling silver goblet appropriately engraved is presented to the winner.

Association of the United States Army Medal and Certificate. Awarded annually by the publishers of Army magazine to the Junior Cadet who has demonstrated outstanding qualities of leadership and efficiency.

Chicago Tribune Awards. Awarded annually to two Military Science I and Military Science II Cadets. The recipients must be members of the Bay State Rifles, who have demonstrated outstanding qualities of leadership and military proficiency.

Society of American Military Engineers Award. A gold medal is presented annually by the Society of American Military Engineers to the outstanding engineering student enrolled in advanced Military Science.

Department of Air Science

Distinguished AFROTC Cadet. Each year the Professor of Air Science will select from the students who are completing the second year advanced course, AFROTC, those who possess outstanding qualities of character, leadership, and a definite aptitude for

the military service for designation as Distinguished AFROTC Cadets.

Distinguished AFROTC Graduate. Each year the Professor of Air Science will designate the Distinguished AFROTC Graduates from those Distinguished AFROTC Cadets who have completed the advanced course, AFROTC, and who will receive their baccalaureate degree. The Distinguished AFROTC Graduates, with their consent, may compete for a regular Air Force Commission.

Air Science Trophy. Awarded by the Department of Air Science to the Air Science freshman cadet most outstanding in Military and Academic Scholarship. The trophy is a silver cup appropriately engraved.

Chicago Tribune Awards. Awarded to two Air Science freshmen and sophomore cadets who have maintained the highest AFROTC grades and general academic excellence. The awards are engraved medals.

AS II Consolidated Vultee Aircraft Corporation Award. Awarded to the most outstanding Air Science Sophomore cadet who has applied for the Advanced Course, is interested in and qualified for Flight Training. The award is an aircraft model.

Sons of American Revolution Medal. Awarded by the Sons of the American Revolution to an Air Science sophomore cadet selected for leadership, soldierly bearing and general excellence. The winner's name is engraved on a medal which is presented to the individual.

Amherst Post American Legion Trophy. Awarded by the Amherst Post American Legion to the Air Science sophomore cadet who has demonstrated the most outstanding abilities in Military Drill and Scholarship. The trophy is an engraved silver cup.

Air Cadet Squadron Trophy. Awarded by the Air Cadet Squadron to an Air Science sophomore cadet who has been an outstanding member of the Air Cadet Squadron and Drill Team. A silver cup appropriately engraved with the individual's name is presented to the winner.

The Society of American Military Engineers Engineering Award. Awarded by the Society of American Military Engineers to the Air Science junior cadet who is the outstanding engineering student of the year in his group in the AFROTC unit, as recommended by the Dean of the School of Engineering and the Professor of Air Science.

Amherst Rotary Club Award. Awarded by the Amherst Rotary Club to the Air Science junior cadet who is the most outstanding

in physical sciences or engineering, and who has demonstrated excellent qualities of leadership and high moral character.

Air Science Trophy. Awarded by the Department to the Air Science junior cadet who has displayed outstanding military proficiency and maintained a high scholastic standing. A silver cup engraved with the individual's name is presented to the winner.

Air Force Association Medal. Awarded by the Air Force Association to the most outstanding Air Science junior cadet. The award is an engraved medal.

Reserve Officers Association Medal. Awarded by the Massachusetts Reserve Officers Association to the graduating Air Force cadet who has been outstanding in scholarship and military proficiency. The award is an engraved medal.

Air Science Trophy. Awarded by the Department of Air Science to the graduating Air Science senior cadet who has demonstrated superior qualities of leadership, military bearing and scholarship. The trophy is an engraved silver cup.

Armed Forces Communications and Electronics Association Medal. Awarded by the Armed Forces Communications and Electronics Association to the graduating Air Science senior cadet majoring in electrical engineering, who has demonstrated outstanding qualities of military leadership, high moral character and a definite aptitude for military service. The award is an engraved medal.

UNDERGRADUATE CURRICULA

Undergraduate instruction is provided in the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, Physical Education, and the Department of Public Health.

This section of the catalogue deals with the opportunities for study and the curricula available in each of these departments of the University.

COLLEGE OF ARTS AND SCIENCES

I. Moyer Hunsberger, *Dean*

The College of Arts and Sciences offers instruction in the fine arts, the humanities, the social sciences, the natural sciences, and mathematics both for students enrolled in the College and for those in other undergraduate divisions of the University. The program provides for the breadth of intellectual development essential to a liberal education and for concentration which is the necessary foundation for competence in a selected discipline.

The Bachelor of Arts degree may be earned by students majoring in any division of the College. The Bachelor of Science degree may be earned by students in the natural sciences, mathematics, or psychology.

The graduation requirements of the College of Arts and Sciences are:

I. The successful completion of at least 120 credits (required physical activity and required ROTC not included in the computation).

II. Basic Requirements—are normally completed in the first two years and consist of:

1. English 1, 2, 25, 26, and Speech 3.
2. Intermediate proficiency in a foreign language, as determined by the successful completion of the second year course at the college level or by examination. The latter may be taken during the summer orientation period prior to the freshman year, or during subsequent language study subject to the approval of the department concerned.
3. One semester course in each of two social sciences.
4. Two of the following: (a) a year in one physical science, (b) a year of biological science which may be in one or in two biological science departments, (c) a year of mathematics or a semester of mathematics and a semester of

logic; students who major in natural science or mathematics must complete all three.

5. a. Candidates for the degree of Bachelor of Arts must complete History 5 and 6.
   b. The Bachelor of Science degree may be earned only by students majoring in Mathematics, Psychology, or a Natural Science who complete at least 60 credits in courses distributed over Mathematics, Psychology and Natural Science.

III. Distribution Requirement—six credits earned in courses of at least two credits in both of the divisions in which the student is not majoring.

In the humanities division, most courses may be offered to meet this requirement; the exceptions* are (a) specialized courses deemed to have a strong pre-professional emphasis and (b) courses which might be offered to meet a basic requirement, but History 5 and 6 may be offered by candidates for the Bachelor of Science degree.

In the social science division, all courses except Economics 12 and 25, Government 25, Psychology 1, 5, and 6, and Sociology 25 may be offered to meet this requirement.

In the division of natural science and mathematics, the courses offered to meet the combined basic and distribution requirement must include: (a) a year in one physical science, (b) a year of biological science and (c) a third year which may be (1) a year of mathematics, (2) a semester of mathematics and a semester of logic, or (3) two courses in natural science except Chemistry 80, Geography 35, 50, 55, and 81, and Zoology 51, (Entomology 26 may be chosen).

For distribution purposes the following groupings have been approved:

a. The Humanities and Fine Arts
   - English
   - Foreign Languages
   - History
   - Art
   - Music
   - Philosophy
   - Speech

b. The Social Sciences
   - Economics
   - Government
   - Psychology
   - Sociology

c. The Natural Sciences and Mathematics
   1. Physical
      - Astronomy
      - Chemistry
      - Geology
      - Physics
   2. Biological
      - Botany
      - Microbiology
      - Zoology
   3. Mathematics

* The list of exceptions will be available to each student at pre-registration time.

IV. MAJOR REQUIREMENTS:

Each student must complete the requirements of one of the major programs described under Junior-Senior Curricula; these programs include at least twenty-four (24) semester hours of credit in some one department, of which at least fifteen (15) must be in courses numbered 50 or above. No student may present for graduation more than thirty (30) junior-senior hours in any one department, exclusive of honors work. A student for whom any basic requirements are waived by examination may use the time thus saved to augment his work in the major by a maximum of six semester hours.

V. SPECIAL PROGRAMS:

Any student who at the end of the first semester of his junior year presents a quality point average of 3.0 or higher, and is recommended by his major department for release from formal requirements, may, with the approval of his adviser and the Dean, work out a special program of study for his senior year. This program can consist of any approved combination of course work and independent research or creative effort.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics or Natural Science[1]	3	Mathematics or Natural Science[1]	3
Natural Science or History 5[2]	3	Natural Science or History 6[2]	3
Foreign Language[3]	3	Foreign Language[3]	3
Elective[4]	3	Elective[4]	3
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1
Physical Education 1, 2 (men)**	2	Physical Education 3, 4 (men)**	2
Physical Education 5, 7 (women)**	2	Physical Education 6, 8 (women)**	2

[1] Candidates for the B.S. degree take Mathematics. Those planning to major in chemistry or physics should, if possible, elect Mathematics 5 and 6.

[2] Candidates for the B.S. degree take natural science; candidates for the B.A. degree take History 5 and 6.

[3] Subject to exemption on basis of proficiency examination.

[4] Candidates for the B.S. degree take science.

* May be taken either semester.

** Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Foreign Language[1]	3	Foreign Language[1]	3
Social Science[2]	3	Social Science[2]	3
Natural Science or Mathematics[3]	3-4	Natural Science or Mathematics[3]	3-4
Elective[2]	3-4	Elective[2]	3-4
Military or Air Science 25 (men)	1	Military or Air Science 26 (men)	1
Physical Education 25, 27 (women)*	2	Physical Education 26, 28 (women)*	2
Physical Education 31, 32 (men)*	2	Physical Education 33, 34 (men)*	2

[1] Subject to exemption on basis of proficiency examination.

[2] In selecting the social science courses and electives, students should be guided by the recommendations for sophomore work given under the descriptions of junior-senior curricula that follow.

[3] The courses in natural science or mathematics should be selected to fulfill the basic requirements (see under "II" above) in this division.

* Not quality point credit.

JUNIOR-SENIOR CURRICULA

Major work is available in the following departments.

Art

P. F. Norton, *Adviser*

The department of art is interested in providing two kinds of training: first, to give each student a good general historical and aesthetic knowledge of the arts; second, to give each student an opportunity to develop his creative ability in the several media of the arts. Majors will have specialized sufficiently to allow them to enroll in a professional art school at an advanced level, or to take jobs upon graduation in business or cultural organizations where some facility in the arts is required.

By arrangement with the School of Education, courses can be so arranged that an art major will secure the necessary credits in education to allow him to teach art in the public schools.

All majors should take Art 14, and either Basic Drawing or Basic Design during their first two years; and in the junior and senior years a sequence of advanced courses as advised by the department.

Astronomy

R. H. Koch, E. C. Olson, *Advisers*

A Department of Astronomy conducted jointly with Amherst, Mount Holyoke, and Smith Colleges provides instruction in this field. All advanced courses are given on a joint basis for students from the four participating institutions.

The Department of Astronomy offers courses which furnish (1) specialization for those planning a career in astronomy and (2)

a background for students in other departments who are interested in astronomy for its cultural or scientific value.

Students majoring in astronomy should plan to finish Astronomy 2, Physics 4 or 7, and Mathematics 30 by the end of their sophomore year.

During the junior and senior years the following courses should be taken: Astronomy 51, 52, 65, 66, 75 and 76; Physics 55, 56; Mathematics 91, 92. Students who plan to go on to graduate school should substitute Physics 61 for Astronomy 52; Mathematics 63 and 83 for Astronomy 75 and 76. These students should also obtain a good reading knowledge of German and French (or Russian).

Botany

D. S. Van Fleet, *Adviser*

Programs in botany prepare students for teaching and research in biological sciences in high schools, universities, industry, and experimental stations.

Students majoring in botany who do not plan to teach in secondary schools should complete the following courses prior to their junior year: Botany 1, 25, 26, Chemistry 1, 2, Zoology 1, and Physics 3, 4.

Students interested in plant morphology, anatomy or systematics will take the following prescribed courses: Botany 57, 67, 81, and Zoology 53; and a minimum of 3 courses will be required from the following: Botany 59, 60, 61, 62, 66 and 89. Majors planning a pre-professional course in plant physiology and plant ecology will be required to take Botany 57, 67, 81, Chemistry 33 and Zoology 53 with additional courses as determined by the major adviser.

Botany majors planning to teach in secondary schools must complete Botany 1, 25, 26, Zoology 1, and 35, and Chemistry 1 and 2 prior to the junior year. Psychology 56 and Education 51 should be completed in the junior year and Education 52, 85, and 88 must be completed in one semester of the senior year; required courses in botany will include a selection of at least 5 courses from the following: Botany 57, 61, 62, 66, 67, 81 and 89; some additional courses in related disciplines will be prescribed by the department adviser.

Chemistry

G. R. Richason, *Acting Adviser*
W. E. McEwen, *Adviser**

The prime purpose of the Department of Chemistry is to offer sound preparation for graduate study in chemistry. Accordingly, emphasis is placed upon intellectual accomplishment and broad understanding rather than on terminal training for specific chemical tasks. The program designed for this purpose also affords

* As of September 1, 1962.

sound preparation for direct entry into chemical industry, chemical institutes, or governmental laboratories. A slightly modified program permits preparation for secondary school teaching.

Effective with the Class of 1966, students planning to major in chemistry should take Chemistry 3, 4; German 1, 2; Mathematics 5, 6; Botany 1 and Zoology 1 (Microbiology 31 or Entomology 26 may be substituted for *one* of these) in the freshman year. The sophomore year should include Chemistry 51, 52 (with the 2 credit Lab.); Mathematics 31, 32; Physics 3, 4 (or 5, 6); German 25, and a science section of German 26. In addition to the required two years of German, majors are urged to elect Russian 1, 2 when possible. Students who must take the Mathematics 1, 4, 29, 30 sequence should, if possible, add Mathematics 91, 92.

An advanced chemistry program is available to students selected by examination prior to freshman registration. These students take Chemistry 25, 26 in the freshman year, replacing 3, 4, and 32.

The junior chemistry major takes Chemistry 32 and 65 during the first semester, and 66 and 67 second semester. Chemistry 68 is to be taken during the first semester of the senior year.

To complete requirements for the B.S. degree with a major in Chemistry, the student must take *four* of the courses listed below. One of these must be a laboratory course, and two different groups must be represented by the selection.

(1) Physical Group: 77, Honors (and certain advanced physics and math courses by approval of the Head of the Department).

(2) Inorganic, Analytical and Radiochemistry Group: 83, 84, 85, 86, 87, Honors.

(3) Organic and Biochemistry Group: 81, 82, 93, 94, Honors.

Students in secondary education may use the Education Block to substitute for two of the non-laboratory courses in the above groups.

Students may satisfy requirements for the B.A. degree by completing the following:

Chemistry 3, 4 (or 1, 2), 32, 51-2 (with the 1 credit Lab.), 65, 66, 67 and the same supporting courses as listed for the B.S. curriculum, except that German (or Russian) is not required. The B.A. degree requirements also include History 5 and 6.

Economics

P. L. GAMBLE, *Adviser*

In economics the aims are twofold: (1) to give the student an understanding of economic theory and of the application of economic principles to the organization of society; (2) to provide students with the elementary training necessary for further study and solution of economic and business problems.

The department requires that all majors irrespective of the career desired take the following courses: Economics 53, 73, Accounting 25, and Statistics 79 or Mathematics 63. In addition, each student must select an additional 12 credit hours of work from the Economics curriculum. No major student is permitted to take more than 36 junior-senior credit hours of economics, agricultural economics and business administration courses. In choosing elective courses students are urged to select courses in the humanities and preferably some from the allied fields of history, philosophy, government, psychology, and sociology. Those intending to major in economics should elect Economics 26 in the sophomore year.

For the majors in economics, there are offered courses which may be combined to serve as preparation toward a number of different careers in business, government, and teaching. Possible fields include: Banking and finance, international trade, labor and personnel relations, market research, public utilities, including transportation, social security, statistics.

English

G. Stanley Koehler, *Adviser*

The major in English affords the student opportunities to improve his knowledge of the English language and his ability to use it clearly, logically, and artistically; to increase his knowledge of Western literature written in English or translated with distinction into English; to read and discuss a literary work with perception and understanding, and to form an independent estimate of it by valid critical standards. Apart from its value as liberal education, such a program is especially helpful to students whose interests lie in writing, editing, criticism, and teaching.

The Department of English offers courses in composition, literature, and language. Students majoring in English must (1) elect a semester of English history; (2) write a documented paper each semester during which a departmental elective in literature is being taken (except during summer session or the Education Block); (3) elect 30 hours (exclusive of honors work) in departmental electives, of which 15 must conform to the distribution requirements of the department; and (4) maintain a quality-point average of 2.0 or better in all departmental electives from the beginning of the junior year on.

Geology

H. T. U. Smith, *Adviser*

For students considering geology as a career, the opportunities are many. Those interested primarily in basic science may look to positions in teaching, in museum work, on state and federal sur-

veys, and in various research organizations. Those concerned mainly with applied science may direct their efforts toward work in mining geology, petroleum geology, engineering geology, and ground-water geology, and industrial mineralogy.

For a major in geology leading to the Bachelor of Science degree, requirements are: one year each of chemistry, physics, and biologic science; mathematics through calculus; 33 credits in geology including courses 1 (or 50), 2, 33, 42, 56, 63, 74, 78, and an approved summer field course; and at least 15 additional hours in mathematics, engineering, geology, or other sciences, elected on consultation with the departmental adviser. German and Russian are recommended for the foreign language.

The Bachelor of Arts degree in geology is admirably suited for those planning to teach general science in secondary schools, and may be useful for those planning to be executives in technical industries. Although the Bachelor of Science degree is intended for those considering a professional career in geology, the Bachelor of Arts degree is also adequate, though less thorough, preparation for graduate work in geology.

For a major leading to the Bachelor of Arts degree, requirements are: one year of each of chemistry and physics; one semester of zoology; mathematics through trigonometry and analytic geometry; and 30 credits in geology, including courses 1, 2, 33, 42, 56, 72, and 74. Strongly recommended also is additional work in related sciences and mathematics, together with a summer field course (which may be substituted for course 72).

All students majoring in the department are required to maintain a quality point average of at least 2.0 for advanced courses in geology. Students planning to teach science in secondary schools, or interested in combining geologic and engineering training, may consult the department head for special provisions relating to their programs.

German

F. C. Ellert, *Adviser*

The courses in German are intended to give a practical knowledge of the language for the purpose of wider reading, research, and oral communication.

To fulfill an undergraduate major in German, a student must complete not less than 24 and not more than 30 credits in the junior-senior German courses. German 57 is required of all major students; also German 79 and 80 (or their equivalent).

For students planning to use the language professionally, German 59 is required; German 77 and 78 and History 66 are strongly recommended. Moreover, they are strongly urged to supplement

the courses taken here at the University with at least one summer session at an approved school of German.

Government

JOHN HARRIS, *Adviser*

The courses offered by the department of government are designed to aid the student in gaining a knowledge of the nature, functions, and problems of government, and of the place of government in the modern world. Political theory, constitutional law, international relations, comparative government, politics and public administration are the principal areas covered.

Students taking work in government may prepare themselves for (1) graduate study in political science and government, (2) careers in public administration at federal, state, and local levels, (3) research concerning governmental problems, (4) the study of law, (5) entrance into foreign service, (6) teaching government and social science courses in secondary schools.

Majors in the field should elect Government 25 and 26 in their sophomore year. In the junior and senior years a minimum of eight additional courses in government is recommended. In addition, supporting courses in the fields of history, economics, sociology, psychology or philosophy are suggested.

History

H. W. CARY, *Adviser*

Courses in history are designed to provide an understanding of man through a study of patterns of development in the past. The study should also give the student an introduction to major problems in world affairs.

A major in history has value to the general student as a humanistic discipline. It has application as preparation for careers in fields of teaching, law, government, journalism, ministry, library and business.

Prospective majors should elect either History 25 and 26 or History 31 and 32 in the sophomore year. Government 25 is recommended. Major students must earn a minimum of 27 credit hours in history from the junior and senior courses. The following courses are required: History 25 and 26, and 31 or 32, and 90. In addition, the student must elect one of the following courses which deals with a period prior to 1500: History 51, 62, or 73; and one seminar course.

Journalism

A. B. MUSGRAVE, *Adviser*

The journalism program is concerned with (1) the study of writing and of communication problems relevant to the media of mass communication, and (2) the best utilization of the University's

liberal education resources by students who plan careers in newspaper work, communications research, public relations, magazine and radio journalism, or some other field of communications.

For such students the journalism courses are intended to provide both increased communication skill and relevant background. The courses may have special value also for students who plan to go into government service, law, education, and similar fields in which knowledge of the process and effects of communication is particularly useful.

To provide students who have a professional interest in journalism with the broadest and most liberal training, an interdepartmental major is available. These majors take 15 credit hours in journalism, 15 hours of junior-senior courses in one other liberal arts area, and an integrated program of elective courses. Journalism courses taught in other departments, such as Advanced Expository Writing (English 51) and Creative Writing (English 53 and 54), are acceptable in meeting the requirement of 15 credit hours in journalism.

Mathematics

A. E. Andersen, *Adviser*

The department offers courses designed to furnish a cultural background as well as a foundation for both undergraduate and graduate work in such fields of science as physics and chemistry, in engineering and in other technical subjects.

The courses recommended for majors in the department are designed to prepare students for high school teaching, graduate study in mathematics, actuarial work, statistical work, or work in industry.

All majors are required to take Mathematics 29 and 30 and Physics 3 and 4 in the sophomore year. In the junior and senior years each major must take Mathematics 53, 54, 91, and 51 or 56, and must, in addition, complete at least 12 credits in other junior-senior mathematics courses. Prospective majors should consult the department for a list of recommended courses.

Microbiology

R. B. Czarnecki, M. Mandel, *Advisers*

The courses in Microbiology are designed to aid the student in acquiring special knowledge of the nature and function of the microbes and to provide an appreciation of the role of experimental biological science in widening man's horizons.

Students concentrating in the field may prepare themselves for graduate study in microbiology and related fields (e.g., biochemistry, medicine, dentistry) and as future teachers and technicians in the biological sciences.

Microbiology majors should immediately begin preparation in Chemistry and plan to include a study of Biochemistry as seniors. A minimum of 20 credits in courses numbered 50 and above in the Microbiology Department and from a number of courses offered in other departments for major credit in Microbiology is required. A list of the latter courses is kept current in the offices of the advisers.

Music

D. ALVIANI, *Adviser*

The undergraduate major program in music is pre-professional, so that courses, music organizations, and private study are the means used to prepare each student. Other undergraduates may minor in music, or follow a sequence of courses for continuing study.

Each major must concentrate on one of the following areas. (1) Music History and Literature, (2) Music Theory, (3) Applied Music (vocal and/or instrumental performance).

A core program of courses for all music majors includes Music Theory 3, 4, 5, 6, (71 or 72), Music History 55, 57, (59 or 62 or 64), Applied Music 13-20.

Three additional credits will be required of each major in music in Theory, or Music History, or Applied Music, depending on the area of concentration.

Students in applied music will prepare a recital program and perform it during the senior year.

Candidates for Certification as teachers of music in elementary and secondary schools need Education 51, 52, 85; Psychology 56; Music 81, 82, 83, 87, and some study in conducting.

The applied music requirements in the core program of courses are to increase or give competence in playing a piano keyboard, and to improve proficiency with the singing voice and/or the playing of an instrument.

Each major must perform a minimum of four semesters with a musical organization, participating in one each of the instrumental, choral, or musical theatre groups.

Majors will be expected to register for as many courses as possible in philosophy, art, theatre, literature (not exclusively English), psychology, religion, and recreation.

Philosophy

C. SHUTE, *Adviser*

Philosophy seeks a comprehensive understanding of the various areas of man's experience in their interrelatedness. In the context of the historically important theories, the courses concentrate on methods of inquiry into the persisting questions of philosophy, standards of thought, clarification of ethical and aesthetic values, and the basis of criticism.

The student majoring in this subject will complete a minimum of 24 semester hours of credit in philosophy, at least 21 of which must be in courses numbered 50 or above. A wide range of supplementary courses is advised, among which the following are suggested:

Anthropology 63; Art (historical courses); Chemistry 88; Education 51; English 63, 64, 72; French 51; German 56, 57; Government 66, 71, 72; Mathematics 53, 54; Music (historical courses); Psychology 61, 90; Sociology 82.

Physics

J. D. TRIMMER, *Adviser*

Courses are designed to accommodate students who desire specialized training in physics, and also to provide required or elected courses for students majoring in engineering, mathematics, chemistry, or other fields.

Majors should take Mathematics 29, 30 or Mathematics 5, 6, beginning if possible at the start of the freshman year. The preferred start in physics is in (Physics 8, 9) a restricted enrollment course for physics majors, beginning with the second semester of the freshman year. In some cases the (first freshman semester, or later) choice of Physics 5, 6, 7 or of Physics 3, 4 may be advisable or acceptable. Selection of the first physics course should be made in consultation with an adviser from the Physics Department. The freshman year should include Chemistry 1, 2 or, for students who may wish to include considerable chemistry in their later studies, Chemistry 3, 4. (For B.A. degree candidates, this means that the History 5, 6 requirement must be met later.) Required upper-division courses are Physics 51, 52, 55, 56, 85, 86. Mathematics courses should include intermediate or advanced calculus, differential equations, and vector analysis.

Pre-Medical and Pre-Dental Curriculum

L. BARTLETT, *Chairman*

Pre-medical and pre-dental students are assigned to faculty advisers for their freshman year. At the end of their second semester, they will be assigned to a member of the Upperclass Committee who will be their adviser for the remainder of the course of study.

Pre-veterinary students may register in the College of Agriculture or College of Arts and Sciences. In the latter case, they will be assigned to advisers in the same manner as the other pre-professional students.

Medical schools do not look with favor on over-specialization in any field. They stress the importance of a broad general education. Since the University requires that every student who graduates

must have selected at least 15 credits of junior-senior courses in some one department, the pre-professional student should include courses beyond the introductory level in all fields, especially in the humanities and social sciences. The student decides on his electives only with the advice and consent of his adviser.

Psychology

C. C. NEET, *Adviser*

The courses in the Psychology Department are planned (1) to impart an understanding of the basic principles, methods and data of psychology as a science and the application of this knowledge to problems of human adjustment; (2) to prepare some majors for graduate study which may lead to a professional career in psychology; and (3) to help prepare others for non-professional careers. In carrying out these aims, majors are urged to elect, with the help of a departmental adviser, a broad program of courses.

Careers open to psychology majors include: guidance and counseling, psychometrics, child welfare, clinical psychology, school psychology, social work, statistical analysis, opinion polling, personnel and industrial work, engineering psychology, college and university teaching and research, and research in federal and state agencies. Graduate training is required for certain of these careers.

Majors must elect Psychology 5 and 6 in the freshman year and any two of Psychology 51, 52, 53 and 63 in the sophomore year. Statistics 77 in the sophomore year, and Psychology 90 in the senior year are required. In addition, one course must be elected from each of three of the following groups: (1) Psychology 61, 62, 65, 66, 67; (2) Psychology 72, 75; (3) Psychology 79, 81, 82, 83, 92; (4) Psychology 56, 85, 86, 87, 88. Each major must elect a minimum of 24 and a maximum of 30 sophomore-junior-senior credits in psychology. Students taking Psychology 1 who then decide to major in psychology go directly into Psychology 6.

Romance Languages

R. B. JOHNSON, MISS CLARKE, MISS JAEGER, *French Advisers*
J. M. FERRIGNO, S. F. WEXLER, *Spanish Advisers*

Two majors are offered: French and Spanish. The courses of these two curricula are intended to give (1) a thorough training in the language skills, (2) an appreciation of the aesthetic and intellectual qualities of the literatures, and (3) a serious insight into the cultures of the nations concerned.

Students majoring in French or Spanish are required to complete 30 approved junior-senior credits (French and Spanish 25-26 credits may be included in the 30), six of which may be in English literature or in another foreign language. All majors must satisfy the

Distribution Requirements of the College of Arts and Sciences, and are required to take French or Spanish 27-28, French 75 or Spanish 64, and French or Spanish 95.

Majors should also be guided by the Departmental documents *Requirements for the Major in French (Spanish)* and *Reading List for French (Spanish) Majors.*

Russian

S. Pastuhov, *Adviser*

Students choosing Russian as their field of major concentration will receive training in reading, writing, speaking and understanding the language, and a knowledge of Russian literature. Russian majors will also acquire the background in Russian history, government and economy necessary for an understanding of the literature and culture of the Russian people.

Russian majors will be prepared to continue their education on the graduate level in the fields of Russian, Slavic Languages and Literatures, or Russian Area Studies.

Russian majors who choose to become teachers or translators will have the necessary preparation and background in the history of the language, or experience in translating scientific, technical and academic material.

Prerequisite is the successful completion of four semester courses in the language (12 credits): Russian 1, 2, 5, 6 or the equivalent.

Requirements for a major in Russian are the successful completion of:

(a) Four semester courses of language study at the junior-senior level (12 credits): Russian 61, 62, 71 and either 63 or 64.

(b) Five semester courses of Russian literature study at the junior-senior level (15 credits): Russian 51, 52, 53, 54, and one of 56, 57, 58.

(c) Seminar course Russian 98.

(d) Two semester courses in Russian History: History 55, 56.

Sociology and Anthropology

J. H. Korson, *Adviser*

The courses in sociology and anthropology are planned with two aims in view: to give the student an understanding of the factors which influence men in their activities and interests as members of society, and to help prepare students for a wide variety of occupational outlets.

Students interested in teaching at the elementary or high school level should take a minor in the School of Education and at least 6 credits in American history with as many credits in American government as can be arranged.

Of the many opportunities in the field of social work, some are

available to college graduates, while others require graduate training in a school of social work.

Aside from opportunities in the business world, many federal agencies and private research organizations seek people who are trained in the research techniques of sociology.

All majors must elect Sociology 25 and 26; Mathematics 1 and 2, or Mathematics 1 and Philosophy 31; and two of the following: Economics 25, Government 25, or Psychology 1; a minimum of 24 and a maximum of 30 Junior-Senior credits in Sociology and Anthropology, of which the following should be taken in the Junior year: Anthropology 63, Sociology 82, and 95. Students who plan to enter the research field or continue their training in sociology or anthropology at the graduate school level, are advised to elect Statistics 77 in the Junior or Senior year and to begin to develop a reading knowledge of French and German.

Students majoring in this department must maintain a minimum quality point average of 2.0 (C grade) or better in Sociology and Anthropology courses.

Social Work

J. H. KORSON, *Adviser*

The American Association of Schools of Social Work indicates that the pre-professional subjects most closely related to professional work in this field are economics, political science, psychology, and sociology. The Association recommends that prospective students of social work or social administration take not fewer than 12 semester hours in one of these subjects while taking less in others. It also recognizes the value of courses in biology, history, English, as well as other subjects contributing to a broad cultural background for the student.

Speech

A. E. NIEDECK, *Adviser*

An undergraduate major in speech may be earned by completing thirty semester hours of course work in the department although nine of these may be earned in English and philosophy. Psychology 26 should be elected as a basic requirement. The student must select an area of concentration in (1) Rhetoric and Public Address, (2) Interpretation and Theatre, (3) Radio and Television, (4) Speech Education, (5) Speech and Hearing Therapy. Students concentrating in Speech and Hearing Therapy may fulfill all the certification requirements of the American Speech and Hearing Association and the Massachusetts State Department of Education. Students interested in preparation as public school therapists should plan to minor in the School of Education. For those interested in work in a rehabilitation or hospital setting, a minor in psychology should be planned.

Zoology

L. Bartlett, *Acting Adviser*
D. Fairbairn, *Adviser**

The courses in zoology have two major aims: (1) to offer students an opportunity to develop an understanding and appreciation of the scientific method as a part of a liberal education; and (2) to provide training for prospective graduate students in biology, medicine, dentistry, and related fields, as well as future teachers and laboratory technicians in the biological sciences.

The following courses are required of Zoology majors planning to teach in high school: Zoology 1, 25, 35; Botany 1, 25, 26; Chemistry 1, 2, 33; Physics 3, 4; Education 51 (junior year); concentrated semester block, Education 52, 85, 88 (senior year); Psychology 56; any fifteen junior-senior credits in Zoology as recommended by the special departmental adviser (especially recommended: Zoology 53, 54, 70, 74, 80 and 81); additional science credits, if desired, recommended from: Entomology 26, Microbiology 31, Geology 28, Wildlife Management 27, Botany 81, Entomology 79, 90.

* As of September 1, 1962.

COLLEGE OF AGRICULTURE

ARLESS A. SPIELMAN, *Dean*

The College of Agriculture offers a broad general education with specific training in a specialized area. Upon the completion of the requirements for graduation, the student will have devoted about one-quarter of his time to pure science, one-quarter to social and humanistic studies, and about one-half to applied science and technology.

A broad choice of electives within the required courses of each curriculum gives the student the opportunity to prepare for a career in research, industry, business, education, conservation, services, or farming.

Each department of the school has specific requirements for graduation which are included in the descriptive matter under the name of the department.

During the first semester of the freshman year, students interested in teaching vocational agriculture, extension work, or specializing in research work, should consult with the head of the department in which they plan to major.

The College has the following departments: Agricultural and Food Economics, Agricultural Engineering, Agronomy, Dairy and Animal Science, Entomology and Plant Pathology, Food Technology, Forestry and Wildlife Management, Horticulture, Landscape Architecture, Poultry Science and Veterinary Science. Students may major in any of these departments except Veterinary Science; preveterinary students are counseled in either Arts and Sciences or Agriculture.

Curricula in Agriculture

Students majoring in Agricultural Engineering follow the program outlined on page 89. All other majors take the following curriculum during the first two years:

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3*	2	Speech 3*	2
Mathematics 1, Introductory[1]	3	Mathematics 2 or 4[1]	3
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1, General	3	Zoology 1, General	3
Military or Air Science 1 (men)	1	Elective[2]	3
Food Economics 1	2	Military or Air Science 2 (men)	1
Physical Education 1, 2 (men)**	2	Physical Education 3, 4 (men)**	2
Physical Education 5, 7 (women)**	2	Physical Education 6, 8 (women)**	2

[1] Candidates for the Bachelor of Vocational Agriculture degree must take Mathematics 01 (in place of Mathematics 1) and either Mathematics 12 or 1 (in place of Mathematics 2).

[2] Elective may be any freshman or sophomore course—most will elect Animal Husbandry 2, Horticulture 2, Entomology 26 or Forestry 26. Some majors in Wildlife Management, Food Management, or Food Technology may prefer a year of foreign language to the Food Economics 1-elective sequence. Food Distribution majors will take Microbiology.

* May be taken either semester or during a later year.

** Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
A Social Science	3	A Social Science	3
A Natural Science or Math.	3-4	A Natural Science or Math.	3-4
Electives[1]	6	Electives[1]	6
Military or Air Science 25 (men)	1	Military or Air Science 26 (men)	1
Physical Education 25, 27 (women)*	2	Physical Education 26, 28 (women)*	2
Physical Education 31, 32 (men)*	2	Physical Education 33, 34 (men)*	2

[1] The student will be guided in his selections by his major adviser.

* Not quality point credit.

(Note) There may be some departures from this program for those majoring in Agricultural Business and Food Distribution. Landscape Architecture is listed separately on page 95.

JUNIOR-SENIOR CURRICULA

At the end of the sophomore year each student selects one of the following curricula as his major to complete his collegiate training.

Agricultural Business

JOHN BLACKMORE, *Adviser*

This curriculum is designed (1) to prepare students for employment in executive positions with firms related to agriculture or for administrative positions with governmental agencies concerned with agriculture and (2) to give the essential undergraduate preparation for a career in agricultural economics, in research, teaching, or

extension work. The course of study, which leads to the degree of Bachelor of Science, combines training in technical agricultural sciences with courses in business management and economics. The resources of the College of Arts and Sciences and of the School of Business are used in addition to those of the College of Agriculture in order to provide a body of course work which gives the student substantial technical training within the framework of a liberal college education.

In the first semester of their sophomore year, students will elect either Mathematics 29 or Mathematics 55, Economics 25 and a course selected from one of the agricultural sciences with the aid of the adviser. In the second semester of the sophomore year, students will elect Agricultural Economics 26, either Psychology 1 or Sociology 25, and either Economics 12 or History 26.

In the Junior and Senior years, students will take Agricultural Economics 75 and 76, or 55 and 97, Agricultural Economics 56, 71, and 95, Statistics 79 and 80, Economics 73 and an additional 9 hours of economics, six hours in business management or accounting and 6 hours in technical agricultural subjects.

Agricultural Engineering

R. W. Kleis, *Adviser*

Agricultural engineering is concerned with the application of scientific engineering principles to agricultural industries. This professional field includes engineering activities related to the design, development and use of mechanical and electrical equipment; structures; and soil and water control systems for the production, processing and preservation of agricultural products and the improvement of rural living. Agricultural engineers are employed by a variety of agricultural industries and organizations for research, development, teaching, and promotional activities.

The program is designed to provide sound training for the agricultural engineering profession. The student majoring in this field will take his freshman and sophomore work at the University and then, under a cooperative agreement, complete his Bachelor of Science program at the University of Maine.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Diff. Calculus	4
Math. 5, Analy. Geom.	4	Chem. 2 or 4, General	3
Chem. 1, General	3	Mech. Engin. 2, Drawing	3
Mech. Engin. 1, Drawing	2	Physics 6, General	3
Physics 5, General	3	Military or Air Science 2	1
Military or Air Science 1	1	Physical Ed. 3, 4*	2
Physical Ed. 1, 2*	2		

* Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
Physics 7, General	4	Psych. 1 or Soc. 25	3
Civil Engin. 31, Surveying	3	Agric. Elective	3
Mech. Engin. 35, Engin. Mat'l.	4	C. E. 34 Statics	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32*	2	Physical Ed. 33, 34*	2

* Not quality point credit.

JUNIOR AND SENIOR YEARS

At the University of Maine.
(Consult Agricultural Engineering Department for details.)

Agronomy

WILLIAM G. COLBY, *Adviser*

The curricula provides basic education and training in soil science, plant science and agrostology. There is sufficient flexibility within the curricula to allow specialization in crops, soils or fine turf.

The core of each curriculum requires those science courses which are basically educational and qualify the individual for investigational, educational or vocational employment in industrial, government or private organizations. Agronomy majors are required to take Agronomy 22, 57, 59. They must also successfully complete the courses listed below for one of the specialized areas of study:

Crop Science:

Agronomy 51, 52, 65; Botany 67; Chemistry 27, 33; Entomology 26; Horticulture 62; Plant Pathology 51; Zoology 53.

Soil Science:

Agronomy 51, 52, 84; Botany 67; Chemistry 29, 32, 33; Physics 3, 4.

Agrostology:

Agrostology 53, 56; Agronomy 52, 65; Botany 67; Chemistry 27, 33; Entomology 26; Plant Pathology 51; Zoology 53.

Animal Science

D. J. HANKINSON, *Adviser*

The animal science curriculum is designed to provide the student with fundamental training in the nutrition, physiology, breeding, selection and management of farm animals. To this purpose all students are expected to take Animal Science 51, 65, 66, 75 and 96; either Animal Science 56 or 78; Zoology 35 and 53;

and Microbiology 31. They also must successfully complete one summer of placement training (in farming, industry or research as determined in consultation) before graduation.

The curriculum is made flexible by permitting specialization in optional fields which prepare the student for positions in dairy or livestock production and marketing, in agribusiness or in education and extension, through electives chosen from the fields of agronomy, agricultural engineering, economics and veterinary medicine. Options emphasizing basic sciences are also available for those preparing themselves for graduate work in such specialized areas of animal science as nutrition, physiology of reproduction or genetics.

Suggested supporting courses and program schedules for the various optional fields of specialization are available from the adviser.

Dairy Technology

D. J. Hankinson, *Adviser*

Major students in dairy technology receive training in the testing, handling, and processing of milk, ice cream, butter, cheese, and other milk products. Practical application is made of chemistry, bacteriology, economics, and engineering in the many phases of dairy work.

Dairy technology graduates may secure responsible positions with commercial dairy manufacturing firms, or with equipment and supply firms. Opportunities are offered in the fields of extension, research, and for sanitation and public health work with city, state or federal agencies.

Major students in dairy technology must successfully complete one summer of placement training in a dairy plant. It is recommended that this requirement be met during the summer immediately following the sophomore year of University residence.

In the junior and senior years, Agricultural Engineering 81 and 82; Public Health 61, 81, 90; Chemistry 33; and Dairy 52, 75, 77, 78, 95 and 96 are required. Recommended electives are courses in Microbiology, Food Technology, and Business Administration.

Entomology

J. H. Lilly, *Adviser*

Courses in entomology acquaint students with all phases of insects and insect control, as well as beekeeping. Trained entomologists find positions in public service and industry, such as teaching at all levels; research, quarantine and regulatory work in State or Federal Service; various roles in public health and pest control activities; research, sales and public relations work in the agricultural chemicals industry; and commercial beekeeping.

Entomology majors are expected to take Entomology 26 in the freshman or sophomore year, and Entomology 53, Chemistry 29 or 33, and Zoology 35 in the sophomore year. In the junior and senior years, Entomology 55, 56, 57, 66, 81, Statistics 77, and Zoology 53 are required.

Electives in entomology and other fields are recommended by the student's adviser according to individual needs. For those anticipating research or teaching careers, requiring graduate study, electives should stress basic sciences and liberal arts courses: botany, chemistry, English, modern languages, zoology and statistics. Students interested in medical entomology should include microbiology, parasitology and public health courses. For work in the fields of pest control, extension, quarantines, or agricultural chemicals, electives from agronomy, forestry, horticulture, plant pathology, speech and courses in applied entomology are among those recommended. A student should consult with his major department as early as possible in his college career.

Food Distribution

JOHN BLACKMORE, *Adviser*

This course of study is designed to prepare students for careers in management in the food industry and in government agencies concerned with food production, processing and marketing. The curriculum leads to the degree of Bachelor of Science. Substantial emphasis is given to training in the scientific and technical principles that underlie modern food processing and marketing. In addition, the curriculum includes courses in business management and in economics plus specialized courses in food marketing and merchandising.

Students following this program of study should take Microbiology 31 in the second semester of their freshman year. In subsequent years they take Economics 25, and 79, Agricultural Economics 26, Food Economics 75 and 79, 95 and 96, Accounting 25, Food Technology 75, Agricultural Engineering 80, Statistics 79, Business Management 61, Business Law 70, Business Management 64, plus 15 hours in elective courses selected with the help of the adviser from the University's offerings in the agricultural and food sciences and 6 hours selected in business administration.

Food Management

N. G. COURNOYER, *Adviser*

The curriculum in Food Management is offered by the Food Technology Department. The program is designed to give the student a general well-rounded background of arts and sciences, coupled with training in subjects useful to the hotel, restaurant, and other food service industries. The nature of the food service

industry requires persons with broad, general backgrounds of business training coupled with a scientific knowledge of foods.

In the sophomore year Food Management majors should take Accounting 25, Chemistry 33, and Food Management 33 the first semester and Accounting 26, Microbiology 31, and Home Economics 30 the second semester. In the junior and senior years Accounting 72, Agricultural Engineering 53, Entomology 60, Finance 65, Food Management 71, 72, 77, 78, 81 and 82, Food Technology 75, General Business 71, Home Economics 52 or 54, 71, and 92, Public Health 63, and Statistics 79 are required plus elective courses selected with the guidance of the major adviser.

Food Technology

W. B. Esselen, *Adviser*

The Department of Food Technology offers two curricula: Food Management (page 92) and Food Technology.

The curriculum in Food Technology provides scientific and applied training in the principles concerned with the processing, preservation, and packaging of foods and food products. The student's background in chemistry, physics, and microbiology is applied to food technology problems and food analysis. Major fields open to graduates include: (1) technical and production work in the food industries; (2) quality control and analytical work related to food products; (3) government food inspection and grading; (4) technological work and research in government, industry, and education.

The selection of supporting courses depends upon the objective of the student, which should be determined as early as possible.

Food Technology majors should take Physics 3 and 4 and Chemistry 29 and 32 in the sophomore year; also, if possible, Microbiology 31. Students planning to take Physical Chemistry should complete Mathematics 29 and 30. In the junior and senior year Agricultural Engineering 81 and 82, Microbiology 51 and 82, Chemistry 51 and 52 and 65 or 79 and Food Technology 51, 52, 61, 62, 91, 92, 95 and 96 are required plus elective courses selected with the guidance of the major adviser.

Forestry

A. D. Rhodes, *Adviser*

The technical curriculum in forestry is concentrated in the field of forest production and management, and leads to the degree of Bachelor of Science. It has professional status, being accredited by the Society of American Foresters. Graduates are prepared for employment with Federal and State agencies and in private industry. The curriculum emphasizes the multiple-use concept of forest land management, and stresses the scientific and economic foundations

of forestry rather than methods. The first two years are devoted largely to science, English, and other cultural-foundational subjects, the last two years mainly to professional subjects of the major.

Following the sophomore year students are encouraged to undertake summer work giving practical field experience in forestry.

Majors in forestry take Forestry 55, 78, and Civil Engineering 27 during nine weeks in the summer following the freshman year; Forestry 59, Physics 3 and 4, Economics 25, Entomology 26, Agronomy 22, and Geology 50, in the sophomore year; Forestry 25, 53, 54, 56, 59, 75, and 84, Botany 67, and Wildlife Management 61, plus social science and humanities requirements in the junior year; and Forestry 57, 71, and 80, Plant Pathology 69, and Entomology 72 in the senior year. Forestry 74, 81, and 82 are recommended electives.

Horticultural Science

G. B. Snyder, A. W. Boicourt and F. W. Southwick, *Advisers*

The major in Horticultural Science permits specialization in any one of the following areas: Floriculture, Olericulture, Pomology. Each of these areas provides basic training in the scientific principles and applied practices relative to the production and marketing of their respective crops—flowers, vegetables, and fruits. Principal areas of employment open to graduates include: (1) teaching in secondary schools; (2) wholesale and retail marketing; (3) service personnel for industrial concerns manufacturing equipment and supplies used in the production and distribution of horticultural crops; (4) commercial production; (5) graduate study leading to professional careers in college teaching, research, and extension with state, federal or private agencies. Each program of specialization also provides ample opportunity for supporting elective courses which will better fit the student for his special objective.

Students who have had no practical experience in the area of their specialization will be required successfully to complete one summer of placement employment in a phase of the flower, fruit or vegetable industry approved by their major adviser. This requirement should be met before the beginning of the junior year.

The following courses in Horticultural Science constitute a "core" required of all students majoring in the department: Horticulture 29, 31, 32, 54, 73, 95 and 98. Course offerings within the areas of specialization are as follows:

Floriculture — Horticulture 55, 75, and 76.

Olericulture — Horticulture 53, 65, and 74.

Pomology — Horticulture 27, 28, and 97.

Students majoring in Horticultural Science will take the follow-

ing courses in their freshman year: first semester—English 1, Mathematics 1, Chemistry 1, Botany 1, Government 25; second semester—English 2, Mathematics 2 or 4, Chemistry 2, Zoology 1, Horticulture 2, Speech 3; plus Physical Education and Military.

The following required courses should be taken during the sophomore year: first semester—English 25, Geology 1, Botany 67, Horticulture 31, and Horticulture 29 (or 27); second semester—English 26, Economics 25, Agronomy 22, Chemistry 27 or 33, and Horticulture 32 (or 28).

Landscape Architecture

R. H. Otto, *Adviser*

Students following this curriculum, which requires 125 credits for graduation, are prepared through a broad academic approach to take up work in the various phases of landscape architecture. This applied design profession is concerned with the development of land for human use and enjoyment.

In addition to the usual areas of interest, such as site planning for private, semi-public and public works of many types, considerable city and regional planning is now available for those interested.

Because of technical requirements, the basic curriculum in this major differs considerably from the typical College of Agriculture program.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Mathematics 7, Algebra and Trigonometry	3	Speech 3	2
Chemistry 1, General	3	Botany 1, General	3
Government 25, American	3	Sociology 25, Introductory	3
Art 33, Basic Drawing	3	Agronomy 22, Soils	3
Military or Air Science 1	1	Land. Arch. 2, Drafting	3
Physical Ed. 1, 2, or 5, 7*	2	Military or Air Science 2	1
		PPhysical Ed. 3, 4, or 6, 8*	2

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Literature	3	English 26, Literature	3
Geology 1 or 50, Physical	3	Entomology 26 or Horticulture 2	3
Civil Engin. 27, Plane Surveying	3	Land. Arch. 24, Construction	4
Land. Arch. 23, Survey of L. A.	3	Land. Arch. 28, Basic Design	3
Land. Arch. 25, Graphics	3	Land. Arch. 30, Plant Materials	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32, or 25, 27*	2	Physical Ed. 33, 34, or 26, 28*	2

* Not quality point credit.

During the junior and senior years, Landscape Architecture 53, 54, 55, 59, 67, 68, 71, 74, 81 and 82 are required, with some adjustments for students preferring city planning as a career. The program is completed with a second social science and suitable electives.

Plant Pathology

W. M. Banfield and R. A. Rohde, *Advisers*

Plant pathology is concerned with the nature and control of plant diseases caused by fungi, viruses, bacteria, nematodes, certain higher plants and unfavorable environmental conditions. Plant pathologists fill positions in public service and in industry, such as teaching at all levels; research in state, federal, university, and industrial laboratories and experiment stations; and extension service through federal, state, and county organizations. They are employed in quarantine and regulatory work, in various roles in plant disease control, and in sales and public relations work in agricultural chemical industries.

Recommended electives for plant pathology majors in the sophomore year are: sophomore botany courses, Entomology 26, and modern language.

In the junior and senior years Plant Pathology 51, 69, and 52 or 90, Botany 57, 66, 67, Chemistry 33 or 52, Zoology 53, Horticulture 62, Statistics 77 are required. Recommended electives are: Plant Pathology 75, 90, Botany 59, 60, 61, 62, 81, 82, Microbiology 55, Statistics 80, Entomology 55, 72, 74, 80, modern language.

Poultry Science

T. W. Fox, *Adviser*

Two general areas of study are available to the student majoring in this department depending on interests and abilities.

(1) Poultry Production and Management—This plan of study will prepare students for farm operations either as owners or managers; as servicemen, specialists and managers in industrial fields; and for federal and state extension work and regulatory programs allied to the poultry industry. The program is supported by electives in business, agricultural economics and communicative skills.

(2) Poultry Science—This program is primarily for students interested in and capable of graduate work leading to careers in poultry science teaching and research and as agricultural scientists with breeding organizations, feed manufacturers and pharmaceutical corporations. Students interested in poultry science supplement the basic curriculum with basic sciences chosen to support further study in poultry genetics, physiology, nutrition and products technology.

Veterinary Science

G. A. Snoeyenbos, *Adviser*

Though major work in Veterinary Science is not available, the department offers supporting courses to assist students who expect to enter the various fields of agriculture, wildlife management,

public health, teaching and laboratory work in the biological sciences.

Wildlife Management

FREDERICK GREELEY, *Adviser*

Wildlife management is concerned with the use of land to produce crops of wild game for recreation, control of harvest of game crops and the control of destructive outbreaks of wild species. An understanding of the influence of land use (for farming, forestry, watershed protection and grazing) on the environment and populations of wildlife is necessary. Basic courses are needed in geology, soils, forestry, agriculture, botany and zoology.

The activities of state and federal conservation agencies within the state provide study material and field demonstrations. The Massachusetts Cooperative Wildlife Research Unit provides numerous opportunities for students to participate in and observe management and research activities.

Graduates in this field find employment primarily in state and federal conservation agencies. Trained wildlife personnel may also find careers in teaching in public schools open to them.

During the first two years basic courses in liberal arts are taken. Sophomores take Geology 1 or 50, Agronomy 22, Botany 26 or Forestry 26, Zoology 25 and Zoology 35. During the junior and senior years students majoring in the field take Wildlife Management 61, 62, 63 and 64, Zoology 71 or 72, Forestry 53 or Botany 81 and Zoology 81.

SCHOOL OF BUSINESS ADMINISTRATION

H. B. Kirshen, *Dean*

The School of Business Administration prepares students to take advantage of important economic opportunities and eventually to assume positions of responsibility in business. The School's educational program is directed toward the broad aspects of business, encouraging high standards of ethical conduct, broad social responsibilities and the development of competence in particular courses of study of the student's own interest, aptitude and choice.

The first two years emphasize general education by providing fundamental courses in the humanities, mathematics, science and social science. In addition, basic courses in accounting and economics prepare the student for further work in the School of Business Administration.

The junior and senior years emphasize a greater degree of spe- But even in these last two years all students need to view business cialization and provide for this in the programs indicated below. as a whole in so far as a "core" of courses can do this. This "core" of courses is listed below under the junior-senior curricula and is required of all students.

A total of at least 120 credit hours is required for graduation exclusive of credit received in the required military and physical education courses.

Each course of study leads to the degree of Bachelor of Business Administration.

Beginning with the class of 1962, the passing of a comprehensive examination is a requirement for a degree for majors in the department of accounting. Comprehensive examinations may also be required by other departments of the School.

Beginning with the class of 1964 all students in the School of Business Administration must attain, as a graduation requirement, a 2.0 average in Accounting 25 and 26, Elementary Economic Statistics 79, and the junior "core" courses: Finance 55, Financial Institutions; Finance 65, Corporation Finance; General Business 71, Business Law I; Management 61, Principles of Management; and Marketing 53, Principles of Marketing. The "core" must be completed by the end of the junior year unless a student, on recommendation of his department chairman, has received permission from the Dean to postpone any such course to the senior year.

Students transferring to the School of Business Administration from any School or College within the University shall receive

junior and senior elective credit only for those courses passed with a grade of C or better.

The School of Business Administration is a member of the American Association of Collegiate Schools of Business.

FRESHMAN YEAR

In each subject a one year sequence is required.

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics	3-4	Mathematics	3-4
Hist. 5, 25, or Govt. 25	3	Hist. 6, 26, or Govt. 26	3
Science: elect one	3	Science: continue 1st sem. sci.	3
Chemistry 1		Chemistry 2	
Physics 3		Physics 4	
Botany 1		Botany 25	
Geology 1		Geology 2	
Zoology 1		Zoology 25 or 35	
Elective†	3	Elective†	3
Military or Air Science 1	1	Military or Air Science 2	1
Physical Ed. 1, 2 (men)**	2	Physical Ed. 3, 4 (men)**	2
Physical Ed. 5, 7 (women)**	2	Physical Ed. 6, 8 (women)**	2

** Not quality point credit.

* May be taken either semester.

† If a language is elected the student must complete the intermediate year to meet the basic School requirement.

If a language is not elected:

Where Government has been elected the student shall elect one of the following: History 5, 6, 25, 26, Economics 12.

Where History has been elected the student shall elect Government 25.

The student shall select, with the help of an adviser, a one-semester elective.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Economics 26, Prob. of Nat'l Economy	3
Accounting 25 or 27, Introduction*	3 or 5	Accounting 26, Introduction II*	3
Psychology 1, General	3	Sociology 25, Introduction to	3
Statistics 79**	3	Mathematics	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32 (men)†	2	Physical Ed. 33, 34 (men)†	2
Physical Ed. 25, 27 (women)†	2	Physical Ed. 26, 28 (women)†	2

* Accounting 27 (5 credits) may be elected in place of Accounting 25 and 26.

** Statistics may be taken either semester, or, with the adviser's consent, may be deferred to the junior year in which case it becomes one of the required "core" courses of the junior year.

† Not quality point credit.

JUNIOR-SENIOR CURRICULA

Courses and major programs are listed under four departments in the School of Business Administration: Accounting, General Business and Finance, Management, and Marketing. Irrespective of any major selected a certain "core" of courses is required of all students.

Required Core Courses	*Credits*
Fin. 55, Financial Institutions	3
Fin. 65, Corporation Finance	3
Gen. Bus. 71, Business Law	3
Mgt. 61, Principles of Management	3
Mkt. 53, Marketing Principles	3

Elective courses shown in major programs are selected with the aid and consent of the student's adviser.

Accounting

J. W. Anderson, *Chairman*

The accounting program is designed to prepare students for public accounting and for positions as accountants in business, industry and government.

	Credits
Required "core" courses	15
Required courses in the major:	15
Acct. 61, Intermediate Accounting	
Acct. 62, Advanced Accounting	
Acct. 63, Cost Accounting	
Acct. 73, Federal Income Tax Procedures	
Gen. Bus. 72, Business Law II or Gen. Bus. 73, Business Law III	
Two elective courses in Accounting	6
Three elective courses	9
Five elective courses outside Business Administration	15

General Business and Finance

R. H. Kyler, *Acting Chairman*

The department has three major programs: *Finance, Business Administration and Economics,* and *General Business.* The curriculum in finance is directed towards the fields of banking, investment, brokerage, insurance or governmental agencies concerned with finance. The curriculum in Business Administration and Economics comprehends a wider field to balance a knowledge of both economics and business. The curriculum in General Business was designed for students who do not wish to specialize in any particular field.

Curriculum in Finance	*Credits*
Required "core" courses	15
Required courses in the major:	18
Econ. 56, Business Fluctuations and Forecasting	
Econ. 73, Modern Economic Theory and Analysis	
Fin. 75, Principles of Insurance	
Fin. 81 and 82, Problems in Business Finance I and II	
Fin. 83, Investments	
Four elective courses from a recommended list	12
Five elective courses outside Business Administration	15

Curriculum in Business Administration and Economics	
Required "core" courses	15
Required courses in Economics:	15
Econ. 56, Business Fluctuations and Forecasting	
Elect two:	
Econ. 70, The Structure of American Industry	
Econ. 77, Economics of International Trade	
Econ. 78, Public Finance	
Econ. 83, Social Control of Business	
Econ. 73, Modern Economic Theory and Analysis	
Econ. 79, Labor Problems	
Two elective courses in Business Administration:	6
Accounting, General Business, Management and/or Marketing	
Two elective courses from the areas of:	6
Economics, Business Law, Statistics and Independent Research	
One elective course	3
Five elective courses outside the fields of Business Administration and Economics	15

Curriculum in General Business	
Required "core" courses	15
Required courses in the major:	9
Gen. Bus. 72 or 73, Business Law	
Stat. 80, Advanced Statistics	
Elect one in senior year:	
Acct. 72, Administrative Accounting	
Fin. 81, Problems in Business Finance I	
Mgt. 92, Problems in Management	
Mkt. 80, Problems in Marketing	

	Credits
Three elective courses in Business Administration	9
Two or three courses in Economics	6-9
One or two courses in Government, Sociology, and/or Psychology	3-6
Five elective courses outside Business Administration and Economics	15

Management

J. T. Conlon, *Chairman*

Industry and business offer qualified students an opportunity to find careers in General Management, Production Management, and in Personnel Management and Industrial Relations. Course programs are offered in each of these fields and provide the student both a specialized and a comprehensive understanding of the managerial process in industrial enterprises.

	Credits
Required "core" courses	15
Required courses in the three major programs:	12
Mgt. 64, Personnel Management	
Mgt. 81, Theory of Business Administration	
Mgt. 85, Management of Production	
Mgt. 92, Problems of Management	
Seven elective courses from a recommended list	21
Four elective courses outside Business Administration	12

Marketing

H. E. Hardy, *Chairman*

Students in marketing prepare for a variety of positions in wholesale and retail enterprises and in the sales activities of manufacturers. The program includes specialized study of basic types of market operations such as advertising, sales management and retailing.

Curriculum in Marketing	Credits
Required "core" courses	15
Required courses in the major:	15
Mkt. 54, Sales and Sales Management	
Mkt. 62, Marketing Research	
Mkt. 71, Retail Merchandising	
Mkt. 73, Advertising	
Mkt. 80, Problems in Marketing	
Three elective courses from a recommended list	9
Two elective courses	6
Five elective courses outside Business Administration	15

Curriculum in Retailing	*Credits*
Required "core" courses	15
Required courses in the major:	18
Art 14, Introduction to Art	
Mkt. 62, Marketing Research	
Mkt. 71, Retail Merchandising	
Mkt. 73, Advertising	
Mkt. 79, Wholesaling	
Mkt. 80, Marketing Problems	
Two elective courses from a recommended list	6
Two elective courses	6
Five elective courses outside Business Administration	15

SCHOOL OF EDUCATION

A. W. Purvis, *Dean*

The School of Education through its undergraduate program seeks to utilize the forces of the University to prepare teachers for elementary and secondary schools and through its graduate offering to prepare administrators and specialists in public education. Its program is based upon the assumption that teachers and other school personnel should have a broad liberal education, considerable mastery of at least one field, and professional courses which should lead to a knowledge of the persons to be taught, familiarity with the problems to be met, and practice in the best techniques of teaching and supervision. In all of this the School of Education takes the position that teacher education is a University function and that success will come only if the School is successful in maintaining the closest possible relationships with other schools and departments that contribute to the program.

All students who contemplate teaching as a career should register early, in their freshman year if possible, with the School of Education although their courses in education do not begin until the junior year. In general, students are admitted without question to the various service courses of the junior and senior years, but admission to the teacher-training program of the concentrated semester block is determined by a composite rating based on scholarship as shown by University grades (a three-year average at least as high as the University median is desired), success in the beginning courses in education, recommendations of University teachers in general education fields, and personality ratings by members of the staff.

Elementary School Teaching

Candidates for this program major in elementary education. In certain cases, with the approval of the Dean of the School of Education, the student may be permitted to major in some department of the College of Arts and Sciences where the general education program is deemed the equivalent of that designed for elementary education majors. This permission should be requested in freshman year. Such students will satisfy the requirements of their major department so far as the first two years are concerned but they should utilize their electives to take such courses as Government 25, Zoology 54, History 25, 26 and Art or Music which are recommended by the School of Education. They should take Education

9, 39, 59. The core program for elementary education majors including Education 51 and 64, and Psychology 65 or Home Economics 70, and the Elementary Education Block should be taken in the junior and senior years.

Students with a major in Elementary Education take the following courses:

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Math. 1 or Chem. 1	3	Math. 2 or 4 or Chem. 2	3
Zool. 1 or Bot. 1	3	Bot. 1 or Zool. 1	3
Foreign Lang.**	3	Foreign Lang.**	3
History 5	3	History 6	3
Education 9†		Education 9†	
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1
Physical Ed. 1, 2 (men)‡	2	Physical Ed. 3, 4 (men)‡	2
Physical Ed. 5, 7 (women)‡	2	Physical Ed. 6, 8 (women)‡	2

* May be taken either semester.
** Intermediate Proficiency Required.
† To be completed in a school year.
‡ Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Psychology 1	3	Sociology 25 or Econ. 25	3
Science*	3 or 4	Zool. 54	3
Government 25	3	Music 1 or Art 14	3
History 25	3	History 26	3
Education 39†		Education 39†	
Military or Air Science (men)	1	Military or Air Science 26 (men)	1
Physical Ed. 31, 32 (men)‡	2	Physical Ed. 33, 34 (men)‡	2
Physical Ed. 25, 27 (women)‡	2	Physical Ed. 26, 28 (women)‡	2

* To be chosen from sophomore courses in the College of Arts and Sciences.
† To be completed in a school year.
‡ Not quality point credit.

JUNIOR AND SENIOR YEARS

During junior year the student takes Education 51, 59, 64, Psychology 65 or Home Economics 70. One semester of senior year is devoted to the concentrated Elementary Education Block (Ed. 60, 61, 62, 85). Majors are expected to utilize their junior and senior electives to take at least 30 credits in the College of Arts and Sciences, of which at least 15 credits should be concentrated in a minor.

Secondary School Teaching

All candidates for secondary school teaching will major in the subject field to be taught and minor in education. A maximum of

eighteen hours should be taken in this minor. Education 51 and Psychology 56 are required during junior year and Education 52, 88, 85 (called the secondary block) in one semester of senior year. Since the concentrated semester block in secondary school teacher-training carries only twelve credits students should consult with their major adviser regarding means of making up the extra three credits, and of meeting all their major requirements in the three semesters of junior and senior years.

Special Field Programs for Prospective Teachers

In Vocational Agriculture (R. C. Jones, adviser). This program is based on a cooperative agreement between the University and the Vocational Division of the State Department of Education which provides supervisors and consultants in conducting the program. Students otherwise qualified may prepare to teach vocational agriculture by the satisfactory completion of Education 72, 73, and 75. Education 52 is also recommended. To insure a desirable range of preparation, students who contemplate vocational teaching should consult, early in the freshman year if possible, Professor Jones and Mr. Annis.[1] A vocational teacher-training certificate is awarded by the Vocational Division to those who fully qualify.

In Home Economics (Mrs. Sullivan, adviser). These students will major in home economics and minor in education. They should elect Education 51, Psychology 56, Home Economics 81 and the concentrated semester block (Education 52, 85).

In Teacher Coaching (S. W. Kauffman, adviser). These students will major in physical education and minor in education. They should elect Psychology 56 and the concentrated semester block (Education 52, 88, 85). They should elect a minor teaching field from the College of Arts and Sciences consisting of a minimum of eighteen hours.

In Music (D. Alviani, adviser). These students will major in music and minor in education. They should elect Education 51, Psychology 56, Music 87, and the concentrated semester block (Education 52, 85).

[1] Mr. Annis is State Supervisor for Agricultural Teacher-Training representing the Vocational Division of the State Department of Education in the administration of vocational agricultural acts.

SCHOOL OF ENGINEERING

G. A. MARSTON, *Dean*

The departments of Chemical Engineering, Civil Engineering, Mechanical Engineering and Electrical Engineering comprise the School of Engineering. Each department offers a curriculum leading to a Bachelor of Science degree in that particular branch. A curriculum in Industrial Engineering is offered in the Mechanical Engineering department.

All curricula are accredited by the Engineers Council for Professional Development.

Engineering can be defined as the combination of science and art by which materials and power are made useful to mankind. An engineer requires intensive technical training but at the same time he should acquire the broad education that distinguishes the professional man from the technician. His education does not end with formal schooling but continues throughout his life as he accumulates experience.

The curricula in engineering have been carefully prepared to offer each student the opportunity to acquire the sound training in mathematics and the basic sciences of chemistry and physics upon which is built the work in the engineering sciences. In the senior year courses are offered which enable the student to use his previous training for engineering analysis, design and engineering systems in his particular field of interest. About twenty per cent of his time is devoted to studies in the social science and humanistic area. Some opportunity is provided to elect courses from both the technical and humanistic-social fields.

The curriculum of the freshman year is the same for all. Specialization to a limited extent begins in the sophomore year.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Calculus	4
Math. 5, Analy. Geom. and Calc.	4	Chem. 2 or 4, General*	3 or 4
Chem. 1, General*	3	M. E. 2, Desc. Geom.	3
M. E. 1, Graphics	2	Physics 6, General	3
Physics 5, General	3	Military or Air Science 2	1
Military or Air Science 1	1	Physical Ed. 3, 4†	2
Physical Ed. 1, 2†	2		

* It is recommended that Chemical Engineering majors take Chemistry 3 and 4 in place of Chemistry 1 and 2.

† Not quality point credit.

SOPHOMORE-JUNIOR-SENIOR CURRICULA

Majors in Engineering will select one of the following curricula.

Chemical Engineering

E. E. LINDSEY, *Adviser*

Chemical Engineering is concerned with the development of manufacturing processes in which chemical or certain physical changes of materials are involved. These are resolved into a coordinated series of unit operations (physical changes) and unit processes (chemical changes). The work of the chemical engineer is primarily concerned with the design, construction, and operation of equipment and plants in which these are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineers are employed not only in industry manufacturing chemicals but in many others, such as petroleum refining, coal processing, refractories and clay products, cement, waste treatment, pulp and paper, rayon and textiles, paint and varnish, natural and synthetic rubber, foods, leather, plastics, soap, penicillin and other antibiotics. Much of the work of the atomic energy program is chemical engineering. The types of work done by chemical engineers include: design, construction, research, development, production, financial and patent appraisal, management, and sales.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ch. E. 25, Fundamentals I	3	Ch. E. 26, Fundamentals II	3
Chem. 29, Qual. Analysis	4	Chem. 32, Quant. Analysis	4
Physics 7, General	4	Economics 25, Elements	3
Math. 31, Calculus	4	Math. 32, Diff. Equations	4
English 25, Humane Letters	3	English 26, Humane Letters	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32*	2	Physical Ed. 33, 34*	2

* Not quality point credit.

SUMMER WORK (3 Weeks)

Ch. E. 75, Instrumentation. Credit, 3.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chem. 51, Organic	4	Chem. 52, Organic	4
Chem. 65, Physical	3	Chem. 66, Physical	3
C. E. 34, Statics	3	C. E. 52, Dynamics	3
Ch. E. 55, Unit Opera. I	4	Ch. E. 56, Unit Opera. II	4
Electives*	3	Ch. E. 80, Kinetics	2
		Ch. E. 88, Chem. Engr. Lab.	2

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ch. E. 81, Heat-Energy Relations	3	Ch. E. 82, Ind. Equil.	3
Ch. E. 93, Comprehensive Problems	3	Ch. E. 94, Comprehensive Problems	3
Ch. E. 95, Seminar	1	Ch. E. 98, Lab. Project II	2
E. E. 61, Fundamentals	4	Ch. E. 96, Seminar	1
Ch. E. 97, Lab. Projects I	1	Ch. E. 76, Automatic Control	3
Chem. 67, Phys. Chem. Lab.	1	Electives*	6
Electives*	5-6		

* Six credits must be taken in the social sciences and 3 in the humanities. The remainder may be in technical or scientific courses or in advanced military.

Civil Engineering

M. P. WHITE, *Adviser*

Civil engineering is concerned with structures, transportation, movement of fluids, use and storage of water, sanitation, and surveying and mapping. A civil engineer may be engaged in research, in planning and designing, in construction, or in maintenance and operation.

The curriculum gives a thorough training in the fundamental physical sciences and at the same time prepares a student for work in any branch of civil engineering, allowing him to specialize to some extent in whatever branch is most interesting to him—sanitation, mechanics and structures, hydraulics, foundation engineering, highway engineering.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Physics 7, General	4
Econ. 25, Elem.	3	Humanities Elective	3
C. E. 31, Surveying I	3	C. E. 32, Surveying II	3
C. E. 34, Statics	3	C. E. 52, Dynamics	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32*	2	Physical Ed. 33, 34*	2

* Not quality point credit.

SUMMER

Either C. E. 28 and 30, Surveying Practice, or approved engineering employment.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
C. E. 53, Strength of Mat. I	3	C. E. 70, Theory of Struct. I	3
C. E. 55, Transport. Engr. I	3	C. E. 77, Sanitary Engr. I	3
C. E. 75, Fluid Mechanics	3	C. E. 80, Soil Mechanics I	3
M. E. 63, Engr. Thermo. I	3	Math. 32, Diff. Equations	4
Geol. 50, Engr. Geol.	3	English 50, Tech. Writing†	2
Soc. Sci. Elective	3	Soc. Sci. Elective	3
C. E. 76, Fluid Mechanics Lab.	1		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
C. E. 71, Structural Design	3	C. E. 62, Engr. Materials	3
C. E. 78, Sanitary Engr. II	3	C. E. 73, Reinforced Concrete	3
E. E. 61, Fundamentals of E. E.	4	C. E. 90, Contracts and Spec.*	3
Tech Electives**	6	C. E. 96, Professional Sem.	1
Humanities or Soc. Sci. Elect.	3	Tech Electives**	6
		Humanities or Soc. Sci. Elect.	3

† May be replaced by M. E. 64.
* May be replaced by E. E. 62.
** Technical electives must be approved by the adviser.
Students taking advanced ROTC or AFROTC courses may substitute these for up to six hours of electives.

Electrical Engineering

G. D. SHECKELS, *Adviser*

Electrical engineering deals with the engineering applications of electricity. Because of its unusual amount of diversity, it is usually convenient to separate it into such main divisions as power, communications, electronics and control, and others.

The undergraduate curriculum is designed to prepare the student for work in any of these fields and to serve as a basis for further specialization. Courses in liberal arts and in engineering courses outside of the department give the student an understanding of the broader aspects of engineering and other fields.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
Physics 7, General	4	C. E. 34, Statics	3
E. E. 41, Circuit Anal. I	4	E. E. 42, Circuit Anal. II	4
Humanities Elective	3	Social Sci. Elect.	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32*	2	Physical Ed. 33, 34*	2

* Not quality point credit.

SUMMER (Following Sophomore Year)

E. E. 85, Electrical Measurements, 3 credit hours.
M. E. 23, Shop, 3 credit hours.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
E. E. 53, Energy Conversion Systems I	4	E. E. 54, Energy Conversion Systems II	4
E. E. 55, Electronics I	4	E. E. 56, Electronics II	4
E. E. 57, Electromagnetic Fields	3	E. E. 58, Elect. Transm. & Transients	3
M. E. 63, Engr. Thermo. I	3	M. E. 64, Engr. Thermo. II	3
C. E. 52, Dynamics	3	C. E. 53, Strength of Materials	3
English 50, Technical Writing	2	Economics 25, Elem.	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
E. E. 83, Transient Analysis	4	E. E. 96, Professional Seminar	1
C. E. 75, Fluid Mechanics or M. E. 82, Heat Transfer	3	M. E. 88, Sc. of Engr. Mat'ls.	3
Major Tech. Elective	4	Major Tech. Electives	8
Humanities or Social Science Elective	3	Social Science Elective	3
Elective	2 or 3	Elective	3
Elective	3		

All electives to be approved by adviser.

Humanities: art, English, foreign-language literature, music, philosophy.

Social Sciences: economics, history, government, psychology, sociology.

Six credits of advanced military or air science may be substituted for six credits of electives.

Mechanical Engineering

W. H. Weaver, *Adviser*

Mechanical engineering is that branch of the profession which, broadly speaking, covers the fields of heat, power, design of machinery, industrial management and manufacturing problems.

Building upon a foundation of mathematics, physics, and chemistry, the department of mechanical engineering undertakes to show the student how fundamental physical laws apply to this field and to give him thorough training in the basic principles so that particular application can be mastered in professional practice. Therefore, no attempt is made to give highly specialized instruction.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
C. E. 34, Statics	3	Physics 7, General	4
M. E. 35, Engin. Mat'l.	4	M. E. 46, Metallurgy	3
Social Sci. Elect.	3	C. E. 53, Strength of Materials	3
Military or Air Science 25	1	Military or Air Science 26	1
Physical Ed. 31, 32*	2	Physical Ed. 33, 34*	2

* Not quality point credit.

SUMMER (Following Sophomore Year)

M. E. 29, Metal Machining and Welding, 4 credit hours.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
C. E. 52, Dynamics	4	C. E. 75, Fluid Mech.	3
M. E. 63, Eng. Thermodynamics I	3	C. E. 76, Fluid Mech. Lab.	1
E. E. 61, Fundamentals	4	M. E. 68, Kinematics	3
Humanities Elect.	3	M. E. 64, Eng. Thermodynamics II	3
C. E. 63, Testing of Mat'ls.	1	M. E. 67, Mech. Instr. Lab.	1
Econ. 25, Elem.	3	E. E. 62, Applications	4
		Engl. 50, Tech. Writ.	2

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
M. E. 87, Engin. Thermodynamics III	3	M. E. 80, Mech. Eng. Lab	2
M. E. 79, Mech. Eng. Lab.	1	M. E. 82, Heat Transfer or M. E. 84, Basic Engin. Analysis	3
M. E. 83, Machine Design	3	M. E. 86, Adv. Machine Des.	3
M. E. 85, Dynamics of Mach.	4	Technical Elect. †	3
M. E. 95, Sem	1	Non-Tech. Elect.	6
Technical Elect. †	3		
Soc. Sci. Elect.	3		

Advanced military students will be allowed up to 6 credits substitution according to Department requirements.

† Technical electives: M. E. 74, 75, 76, 77, 82, 84, 90, 94; I. E. 54, 86; C. E. 88. Humanities elective: art, English, foreign-language literature, music, philosophy.

Social Science electives: history, government, sociology, psychology, economics.

Industrial Engineering

W. H. Weaver, *Adviser*

Industrial engineering is concerned with the engineering aspects of the organization, operation and management of manufacturing plants. Consequently, the industrial engineering curriculum is built on a foundation of mechanical engineering. To the technical knowledge and scientific attitude developed through the study of engineering is added the study of certain courses in the humanities, in economics, and in management.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Econ. 25, Elem.	3	I. E. 53, Work Simplification	4
M. E. 63, Engr. Thermo. I	3	M. E. 64, Engr. Thermo. II	3
C. E. 52, Dynamics	3	Humanities Elect.	3
E. E. 61, Fundamentals	4	E. E. 62, Applications	4
I. E. 51, Ind. Mgt.	3	M. E. 68, Kinematics	3
Stat. 77, Elem. Exp.	3	I. E. 56, Data Processing	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
C. E. 75, Fluid Mech.	3	I. E. 78, Prod. Control	3
M. E. 81, Exp. M. E.	2	I. E. 80, Cost Control Eng.	3
M. E. 83, Mach. Design	3	I. E. 54, Eng. Econ.	3
I. E. 75, Job Evaluation †	2	I. E. 96, Sem. †	1
I. E. 77, Factory Planning	2	Non-Technical Elective †	3
I. E. 79, Prob.	3	Engl. 50, Tech. Writ	2
Non-Technical Elective †	3	Soc. Sci. Elect. *	3

† Advanced military students will be allowed up to six credits substitution according to Department requirements.

* Social Science elective: history, government, sociology, psychology, economics.

Engineering Science Option

Departmental Advisers

Engineering science is concerned with the application of the basic sciences to research and development in the engineering field. As such the curriculum contains extensive mathematics, physics, and other courses in the basic sciences designed to develop the student's skill in precise physical reasoning, analysis and synthesis. The student may elect the option from one of the four major departments at the end of his sophomore year provided he has completed his freshman and sophomore years with a quality point average of 2.80 or above or has achieved a cumulative average of 3.20 for the two preceding semesters.

The freshman year is the same for all students and the sophomore year corresponds to that major department in which the student is enrolled. Every student enrolled in the engineering science option must satisfy the following core curriculum:

Course	*Credits*
Chem. Eng. 25, Fundamentals	2
C. E. 34, Statics	3
C. E. 52, Dynamics	3
C. E. 75, Fluid Mechanics	3
E. E. 41, Circuit and Field Analysis I	4
E. E. 42, Circuit and Field Analysis II	4
M. E. 63, Engin. Thermodynamics I	3
M. E. 87, Engin. Thermodynamics III	3
M. E. 96, Science of Engineering Materials	3
Math. 75, Adv. Calc. for Engineers I	3
Math. 76, Adv. Calc. for Engineers II	3
Eng. Science Seminar	No credit

In addition to the above core curriculum students must satisfy certain other courses as are prescribed by the department in which he is enrolled. In the remainder of his courses required for graduation, exclusive of University and School of Engineering requirements, the student is allowed considerable flexibility, subject only to the approval of his departmental adviser. The degree received is the same as that offered by the department in which the student is enrolled.

SCHOOL OF HOME ECONOMICS

MARION A. NIEDERPRUEM, *Dean*

The School of Home Economics encompasses an area of study which applies the principles and concepts of the fundamental arts and sciences to the physiological, psychological, social, and economic environmental needs of man.

The curricula of the school have been designed to provide a liberal education with depth in specialized areas of Foods and Nutrition, Textiles-Clothing and Related Arts, and Home Economics Education to insure professional competence. The transitional continuing relationships between liberal and professional education seek to develop in the student a disciplined mind, mental curiosity, and professional aspirations.

Options under these majors lead to challenging and creative positions in industry, government, business, education, and service. Experience and advanced study in areas of specialization are needed to meet the demand for competent Home Economists to assume responsible roles in today's progressive society, and to develop the administrators, executives and research leaders for the future. The candidates for BS degree in Home Economics will meet the University's general education requirements and core courses* in Home Economics as well as specific requirements prescribed in each field of specialization.

The following new curricula will become effective with the class of 1966. For currently enrolled upperclass students a transitional program will be evolved integrating the new courses.

* Core Courses: FN 27; TCRA 21, 23; MFE 50.

FOOD AND NUTRITION

Food and Nutrition offers curricula which provide a strong foundation in the arts and sciences to support basic courses in foods and nutrition under two options: Dietetics and Institutional Administration; and Food and Nutrition in Business.

Dietetic and Institutional Administration

This curriculum is planned to meet the basic requirements of the American Dietetic Association for admission to approved dietetic internships or other on-the-job training programs. In addition, the curriculum includes liberal studies to help meet the demands of today's society. The program prepares the graduate for positions as staff and administrative dietitians in various types of food service; nutritionists with schools, Public Health and social

welfare agencies; teaching and research dietitians. The sequence offers opportunities for further work at the graduate level for the student interested in college teaching, positions with extension and other government services, research in institutions of higher learning, medical centers and industry.

Major in Dietetic and Institutional Administration

	Credits		*Credits*
General Education	60	Professional	25
Home Economics Core	9	Electives	15
Semi-Professional (incl. Gen. Ed.)	15	Physical Education	8
		Credits 124	

	Credits
I. *General Education*	
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Economics 25, Elements of	3
Sociology 25, Introductory	3
Psychology 1, General	3
History 5, 6, 25, or 26, *or* Government 25, 26, 51, 52, 61, 62, or 66	3
Chemistry 1 and 2, General	6
Chemistry 33, Organic	4
Chemistry 79, Elementary Biochemistry	4
Zoology 1, Introductory	3
Zoology 35, Vertebrate Physiology	3
Microbiology 31, Introductory	4
Mathematics 1, Introductory	3
Accounting 25, Introduction to Accounting	3
Limited Electives—to be selected from the following areas: Music, Art, Speech, Anthropology, Philosophy, or Language	6
II. *Home Economics Core*	
FN 27, Man and Nutrition	3
Select two from remaining three core courses: TCRA 21, Man and Clothing; TCRA 23, Art for Living; MFE 50, Family Management and Decision Making	6
III. *Semi-Professional*	
FN 30, Food Science and Preparation	3
HEEd. 81, Adult Education in Home Economics	3
Limited Electives—to be selected from the following sequence: MFE 74, Consumer Attitude and Demand; MFE 77, Theory and Application of Management; Public Health 61 or 62, General & Community Sanitation; Economics 79, Labor Problems; Horticulture 74, Merchandising of Perishables, *or*	9
Honors	6
Research Problems	3

IV. *Professional*

FN 51, Meal Management	3
FN 91, 92, Institutional Administration	8
FN 52, Advanced Nutrition and Dietetics	3
FN 89, Nutrition in Disease	3
FN 94, Experimental Foods	3
Management 64, Personnel Management	3
FN 95, Seminar in Institutional Administration or Foods	1
FN 96, Seminar in Nutrition	1
Electives	15

Major in Dietetic and Institutional Administration

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3 *	2	Chemistry 2, General	3
Chemistry 1, General	3	Psychology I, General	3
FN 27, Man and Nutrition	3	Mathematics 1, Introduction	3
Foreign Language or Humanities Elective	3	Zoology 1, Introduction	3
Sociology 25, Introductory	3	Physical Education 6, 8 †	2
Physical Education 5, 7 †	2		

* May be taken either semester.

If a foreign language is elected, student must complete the intermediate year.

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Economics 25, Elements of	3	History or Government Elective	3
Zoology 35, Vertebrate Physiol. *	3	Microbiology 31, Introductory *	4
Chemistry 33, Organic	4	FN 30, Food Science and Preparation	3
Elective	3	Accounting 25, Introduction	3
Physical Education 25, 27 †	2	Physical Education 26, 28 †	2

* May be taken either semester.

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
FN 51, Meal Management	3	FN 52, Adv. Nutri. & Diet.	3
Limited Elective	3	FN 94, Experimental Foods	3
HE Core Elective	3	HE Core Elective	3
Chemistry 79, Elementary Biochem.	4	Limited Elective	3
HEEd. 81, Adult Ed. in HE	3	Management 64, Personnel Mgt.	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
FN 89, Nutrition in Disease	3	FN 92, Quantity Food Preparation	4
FN 91, Inst. Adm.	4	FN 96, Seminar in Nutrition	1
FN 95, Seminar in Inst. Adm. or Foods	1	Elective	6
Electives	6	Limited Elective	6

Food and Nutrition in Business

This curriculum is based on professional training in Food and Nutrition combined with selected courses in the humanities, social sciences and business. The program is designed for the student who is oriented to the business world, and leads directly into product development or consumer services with food and equipment industries. Positions are open in the field of communications for the student who combines her knowledge of Food and Nutrition with Journalism, English and Public Speaking. Graduates with a major in this sequence are also placed in advertising and public relations agencies or with a consulting firm. This curriculum allows students to pursue graduate study.

Major in Food and Nutrition in Business

	Credits		*Credits*
General Education	65	Professional	23
Home Economics Core	9	Electives	15
Semi-Professional (incl. Gen. Ed.)	16	Physical Education	8
		Credits 128	

I. *General Education*	*Credits*
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Speech 51, Voice and Diction and Oral Interpretation	3
Philosophy 11, Basic Ideas Western Civilization *or* 31, Intro. Logic and Scientific Method *or* 42, Ethics *or* 82, Aesthetics	3
Journalism 51, Intro. to Mass. Communications	3
Psychology I, General	3
Economics 25, Elements of	3
Food Economics 75, Food Marketing	3
Food Economics 78, Food Merchandising	3
Sociology 25, Introductory	3
Government 25, American *or* Government 66, American Political Thought	3
Chemistry 1 and 2, General	6
Chemistry 33, Organic	4
Mathematics I, Introductory	3
Zoology 1, Introductory	3
Zoology 35, Vertebrate Physiology	3
Microbiology 31, Introductory	4
Art 31, Basic Design	3

II. *Home Economics Core*

FN 27, Man and Nutrition	3
TCRA 23, Art for Living	3
MFE 50, Family Management and Decision Making	3

III. *Semi-Professional*

MFE 75, Personal and Family Economics	3
MFE 77, Theory and Application of Management	3
Marketing 53, Marketing Principles	3
Marketing 62, Marketing Research	3
Chemistry 79, Elementary Biochemistry *	4

* Not required for utility work. Substitute Marketing 54, Salesmanship & Sales Management.

IV. *Professional*

FN 30, Food Science and Preparation	3
FN 51 Meal Management	3
FN 52, Advanced Nutrition and Dietetics *	3
HEEd. 61, Communication by Demonstration Methods	3
FN 92, Quantity Food Preparation	4
FN 94, Experimental Foods	3
MEF 74, Consumer Attitudes and Demand	3
FN 95, Seminar in Foods	1
Electives	15

* Substitute FN 73, Nutrition During Growth and Development for Home Service Emphasis.

Major in Food and Nutrition in Business

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3, Communications	2	Psychology I, General	3
Chemistry 1, General	3	Chemistry 2, General	3
FN 27, Man and Nutrition	3	Zoology 1, Introductory	3
Sociology 25, Introductory	3	TCRA, Art for Living	3
Elective	3	Elective	3
Physical Education 5, 7 †	2	Physical Education 6, 8 †	2

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Chemistry 33, Organic	4	Microbiology 31, Intro.	4
Speech 51, Voice & Diction	3	FN 30, Food Sci. & Prep.	3
Zoology 35, Vertebrate Physiology	3	Mathematics I, Intro.	3
Elective	3	Economics 25, Elements	3
Physical Education 25, 27 †	2	Physical Education 26, 28 †	2

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
FN 51, Meal Management	3	FN 52, Advanced Nutri. & Diet. **	3
MEF 75, Personal & Family Finance	3	FN 94, Experimental Foods	3
Chemistry 79, Elem. Biochem. *	4	Philosophy—select one:	
or Marketing 54	3	11, Basic Ideas of West. Civ.	
Marketing 53, Principles	3	31, Intro. Logic & Sci. Meth.	
Journalism 51, Introduction to Mass Communication	3	42, Ethics	
		82, Aesthetics	3
		MFE 50, Family Mgt. & Decision Making	3
		Elective	3

* Not required for students interested in utility work.

** FN 73, Nutrition During Growth and Development, for students interested in Utility Work.

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
HEEd. 61, Communication by Demonstration Methods	3	FN 92, Quantity Food Prep.	4
FN 95, Seminar in Foods	1	Food Econ. 78, Food Merchandising	3
MFE 74, Consumer Attitudes & Demand	3	Government 25, American *or* Government 66, Amer. Polit. Thought	3
MFE 77, Theory & Appl. of Management	3	Marketing 62, Marketing Research	3
Food Economics 75, Food Mkt.	3	Art 31, Basic	3
Elective	3		

Textiles, Clothing and Related Arts

A field of specialization in this area is entitled Fashion in Retailing and Business. The retailing and professional opportunities associated with clothing, textiles, home furnishings and related merchandise are limitless. They include positions with manufacturers, producers, retailers, buying organizations, newspapers and magazines, radio and TV, consumer groups as well as educational institutions and social and government agencies. The student who is interested in the business field can get, by specializing in this area, a curriculum with a strong program of liberal arts with emphasis on the social sciences. Courses which build on this base toward professional business competency include fundamentals of clothing, textiles, fashion and related arts as well as courses in business, retailing and related subjects.

Major in Fashion in Retailing and Business

	Credits		*Credits*
General Education	60	Professional	24
Home Economics Core	9	Electives	12
Semi-Professional (including Gen. Ed.)	22	Physical Education	8
		Credits	127

HOME ECONOMICS

I. *General Education*	*Credits*
English 1 and 2, Composition	4
Speech 3, Oral Communication	2
English 25 and 26, Masterpieces of Western Literature	6
Foreign Language or Proficiency	12
Mathematics I, Introductory	3
Physical or Biological Science—3 Sciences *or* 2 Sciences and Math II	9
Sociology 25, Introductory	3
Psychology I, General	3
Economics 25, Elements of	3
Economics 55, Consumption and Personal Finance	3
Limited Electives, one from each following sequence: Philosophy 31, 42, 82; Government 25, 66; Sociology 59; Psychology 62, 79	12
II. *Home Economics Core*	
TCRA 21, Man and Clothing	3
TCRA 23, Art for Living	3
FN 27, Man and Nutrition *or* MFE 50, Family Management and Decision Making	3
III. *Semi-Professional*	
TCRA 28, Fundamentals of Clothing Const. *or* TCRA 53, Advanced Clothing Construction	3
TCRA 24, Textiles I	3
TCRA 86, Textiles II	3
TCRA 65, Apparel Selection and Design	3
TCRA 66, Apparel & Home Furnishing Accessories	3
TCRA 85, Fashion Industries	4
HEEd. 61, Communication by Demonstration Methods	3
IV. *Professional*	
TCRA 42, Fashion in Retailing and Business	3
Marketing 53, Principles	3
Marketing 71, Retail Merchandising	3
MFE 74, Consumer Attitudes and Demand	3
TCRA 93, Retailing Field Experience	6
TCRA 95, Seminar in Fashion in Retailing & Business	3
TCRA 97 or 98, Problems in Retailing	3
Electives	12

Major in Fashion in Retailing and Business

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3, Communication	2	Science, Physical or Biological	3
Science, Physical or Biological	3	Psychology, I	3
Sociology 25	3	Language	3
Language	3	TCRA 24, Textiles I	3
TCRA 23, Art for Living	3	Physical Education 6, 8 †	2
Physical Education 5, 7 †	2		

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Science, Physical or Biological or Mathematics 1	3	Mathematics 1 or 2	3
Economics, 25	3	Economics, 55	3
Language	3	Language	3
TCRA 21, Man & Clothing	3	TCRA 42, Fashion in Retailing and Business	3
Physical Education, 25, 27†	2	TCRA 28, Fund. of Clothing Construction *or* TCRA 53, Adv. Clothing Construction	3
		Physical Education 26, 28 †	2

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Marketing 53, Prin.	3	Marketing 71, Retail Merch.	3
Sociology 59, Social Stratification or Anthropology 63 Social	3	MFE 74, Con. Attitudes and Demand	3
TCRA 65, Apparel Selection and Design	3	Psych. 62, Social or Psych. 79, Personality	3
HEEd. 61, Communication by Demonstration Methods	3	TCRA 66, Apparel and Home Furnishing Accessories	3
Elective	3	Elective	6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Block		Government 25, Amer. or Gov. 66, Amer. Pol. Thought	3
TCRA 85, Fashion Indus.	4	TCRA 86, Textiles II	3
TCRA 95, Seminar in Fashion Retailing & Business	3	Philosophy 42, Ethics or Philos. 31, Logic or Philos. 82, Aesthetics	3
TCRA 93, Retailing Field Experience	6	Core Elective	3
		Elective	3

HOME ECONOMICS EDUCATION

Home Economics Education offers curricula which provide a broad cultural education and preparation for teaching under two options: Secondary Education and Extension; and Nursery School Education.

Secondary Education and Extension

The School of Home Economics, in cooperation with the School of Education, prepares students for teaching Home Economics in junior and senior high schools. Students interested in Home Economics Extension, with the aid of an extension advisor, select courses that prepare them for continuing education positions in extension in both adult and 4-H programs. This curriculum pro-

vides basic training for graduate work in the field of home economics teaching and extension.

Major in Secondary Education and Extension

	Credits		*Credits*
General Education	61	Professional	34
Home Economics Core	9	Electives	9
Semi-Professional (including Gen. Ed.)	15	Physical Education	8
		Credits	128

		Credits
I.	*General Education*	
	English 1 and 2, Composition	4
	English 25 and 26, Masterpieces of Western Literature	6
	Speech 3, Oral Communication	2
	Speech 51, Voice & Diction & Oral Interpretation *or* English 51, Advanced Expository Writing	3
	Sociology 25, Introductory	3
	Sociology 57, The Family	3
	Psychology 1, General	3
	Psychology 56, Educational	3
	Psychology 66, Adolescent	3
	History 25 and 26, American	6
	Philosophy 11, 31, 42, or 51	3
	Government 25, 52, 53, 56, 63, 66, or 72	3
	Economics 25, Elements of	3
	Chemistry 1 and 2, General	6
	Chemistry 33, Organic	4
	Mathematics 1, Introductory	3
	Sociology 51, 52, 59, 75 *or* Economics 26, 53, 55	3
II.	*Home Economics*	
	FN 27, Man and Nutrition	3
	TCRA 23, Art for Living	3
	MFE 50, Family Management and Decision Making	3
III.	*Semi-Professional*	
	Education 51, History of Education	3
	Education 52, Principles and Methods of Teaching	3
	FN 30, Food Science and Preparation	3
	TCRA 24, Textiles I	3
	TCRA 28, Fundamentals of Clothing Construction *or* TCRA 21, Man and Clothing	3
IV.	*Professional*	
	HEEd. 82, Curriculum in Home Economics	3
	Ed. 85, Observation and Student Teaching	6
	FN 51, Meal Management	3
	FN 73, Nutrition During Growth and Development	3
	TCRA 53, Advanced Clothing Construction	3
	TCRA 65, Apparel Selection and Design	3
	TCRA 79, Interior Design	3
	MFE 75, Personal and Family Economics	3
	HEEd. 61, Communication by Demonstration Methods	3
	MFE 77, Theory and Application of Management	3
	HEEd. 95, Seminar in Home Economics Education	1
	Electives	9

Major in Secondary Education and Extension

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 1, Composition	2
Speech 3, Oral Communication	2	Psychology I, General	3
Chemistry 1, General	3	Chemistry 2, General	3
FN 27, Man and Nutrition	3	Mathematics I, Introductory	3
Sociology 25, Introductory	3	TCRA 24, Textiles I	3
Government 25	3	Physical Education 6, 8 †	2
Physical Education 5, 7 †	2		

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Philosophy 11, 31, 42, or 51	3	Economics 25, Elements of	3
Chemistry 33, Organic	4	FN 30, Food Science & Prep.	3
TCRA 25, Art for Living	3	TCRA 28, Fund. Cloth. Const. *or* TCRA 21, Man and Clothing	3
TCRA 65, Apparel Select. & Design	3	MFE 50, Fam. Mgt. & Decis. Making	3
Physical Education 25, 27 †	2	Physical Education 26, 28 †	2

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Speech 51 *or* English 51	3	Psychology 56, Educational	3
Sociology 57, The Family	3	Ed. 51, History of Education	3
FN 51, Meal Management	3	History 26, American	3
TCRA 53, Adv. Clothing Construction	3	MFE 77, Theory & Appl. of Management	3
History 25, American	3	Electives	6
HEEd. 95, Seminar in HEEd.	1		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Psychology 66, Adolescent	3	Education 52, Methods	3
FN 61, Communication by Demonstration Methods	3	HEEd. 82, Curriculum	3
TCRA 79, Interior Design	3	Education 85, Practice Teaching	6
MFE 75, Family Economics	3		
FN 73, Nutrition During Growth and Development	3		
Elective	3		

Nursery School Education

Students with a special interest in young children may elect this option. All are required to take courses in the College of Arts and Sciences which enrich the basic courses of the Nursery School Education curriculum. Observation and participation in the nursery school activities facilitate the study of the pre-school child. More

intensive specialization for qualified students may be obtained through the election of one semester affiliation during the senior year with: (1) Merrill-Palmer School in Detroit, Michigan, which specializes in the study of human development and family life; (2) Eliot-Pearson School in Boston, Massachusetts, which gives professional training for teaching in nursery schools and kindergartens. This option prepares the student to become a nursery school teacher, a teacher of exceptional children-nursery school level, or a teacher in hospital recreation programs. A student graduating with an option in Nursery School Education is well-qualified to pursue graduate work.

Major in Nursery School Education

	Credits		*Credits*
General Education	60	Professional	28
Home Economics Core	9	Electives	15
Semi-Professional (including Gen. Ed.)	9	Physical Education	8
		Credits 121	

I. *General Education*	*Credits*
English 1 and 2, Composition	4
English 25 and 26, Masterpieces of Western Literature	6
Speech 3, Oral Communication	2
Zoology 1, Introductory	3
Zoology 37 and 38, Human Anatomy and Physiology	6
Sociology 25, Introductory	3
Psychology I or II, General	3
Economics 25, Elements of	3
Government 25, 52, 53, 56, 63, 66, or 72	3
Statistics 77, Elementary Experimental Statistics	3
Philosophy 11, 31, 42, 51, 72, or 82	3
English 51, or Speech 51, 91, 92, or 93	3
Foreign Language or proficiency (if proficiency in language is accomplished before the completion of 12 credits, electives taken in place of the language are to be chosen from a selected list of courses from the following areas: Zoology, Psychology, Speech, Sociology and Anthropology, Recreation and Physical Education, Education, and Public Health)	12
Limited Electives To be chosen from the following areas: Anthropology, Art, Biological Sciences, Economics, Education, English or American Literature, History, Home Economics (core only), Music, Physical Sciences	6
II. *Home Economics Core*	
FN 27, Man and Nutrition	3
TCRA 23, Art for Living	3
MFE 50, Family Management and Decision Making	3
III. *Semi-Professional*	
Anthropology 63, Social Anthropology	3
Psychology 83, Abnormal Psychology	3
Limited Elective (from above suggestions under Foreign Language)	3

IV. *Professional*

HD 70, Child Development	3
Sociology 57, The Family, or HD 80, Human Dev. in Fam.	3
Music 85, Music Education—Music for the Elementary School Teacher	3
HEEd. 63, Art Activity in Recreation	3
Elective from area of Psychology, Zoology, Sociology, Recreation and Physical Education, Education, Public Health, Speech	3
HD 83, 84, Nursery School Management	6
FN 73, Nutrition During Growth and Development	3
HD 95, Seminar in Human Development	1
HD 97, Problems in Nursery School Management	3
Electives	15

Major in Nursery School Education

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Zoology 1, Introductory	3	Economics 25, Elements of	3
Foreign Language or proficiency	3	Foreign Language or proficiency	3
FN 27, Man and Nutrition	3	Sociology 25, Introductory	3
Psychology 1 or 5, General	3	Elective	3
Speech 3, Oral Communication	2	Physical Education 6 and 8 †	2
Physical Education 5 and 7 †	2		

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Zoology 37, Human Anatomy and Physiology	3	Zoology 38, Human Anatomy and Physiology	3
Foreign Language or proficiency	3	Foreign Language or proficiency	3
HD 70, Child Development	3	TCRA 23, Art for Living	3
Elective	3	Sociology 57, The Family *or* HD 80, Human Dev. in Family	3
Physical Education 25 and 27 †	2	Physical Education 26 and 28 †	2

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
HD 83, Nursery School Mgt.	3	Psychology 83, Abnormal	3
HEEd. 63, Art Activity in Recreation	3	HD 84, Nursery School Mgt.	3
MFE 50, Mgt. & Decision Making	3	Statistics 77, Elem. Experimental	3
Music 85, Music Ed.—Music for the Elementary School Teacher	3	English 51 *or* Speech 51, 91, 92 or 93	3
Elective	3	Government 25, 52, 53, 56, 63, 64, 66, or 72	3

HOME ECONOMICS

SENIOR YEAR

1st Semester	*Credits*
Anthropology 63, Social	3
FN 73, Nutrition During Growth and Development	3
Philosophy 11, 31, 42, 51, 72 or 82	3
HD 95, Seminar in Human Development	1
HD 97, Special Problems in Nursery School Education	3
Elective	3

2nd Semester	*Credits*
Affiliation at the Merrill-Palmer Institute or the Eliot-Pearson School *or* Electives selected Psychology, Speech, Sociology, Recreation, Physical Ed., Education, Public Health, Zoology	3
Electives: to be chosen from the areas of Anthropology, Art, Biological Sciences, Economics, Education, English or American Literature, History, H. E. (core only), Music, Phys. Sci., Psychology, Sociology	6
Electives	6

SCHOOL OF NURSING

MARY A. MAHER, *Dean*

The basic nursing program is designed to prepare the qualified high school graduate for a career in professional nursing, as well as for the responsibilities of family and community life.

The program aims to equip the graduate with those understandings and skills which are needed to function effectively in beginning positions in a variety of nursing situations. These include the ability to provide competent nursing care to patients and families in the hospital, home and community; to participate with allied professional and citizen groups for the improvement of total health services to individuals and communities; to participate in organizing, planning and directing the work of nursing auxiliary workers. A foundation is laid for advanced study, through which the nurse may prepare for positions in teaching, supervision, administration, consultation and research.

During the first two years at the University, the student builds an educational foundation upon which to base the more specialized portion of the program. Courses in the humanities and in the sciences—biological, physical and behavioral—are taken with other students on the campus.

The clinical aspects of the program are developed in the next two years, when instruction and correlated clinical practice are given in selected cooperating agencies by the nursing faculty of the University and the allied professional staffs of the cooperating agencies. These agencies include: the Springfield Hospital; the Wesson Maternity Hospital, Springfield; the Visiting Nurse Association of Springfield, the Springfield Health Department; and other community health, educational and welfare resources.

The Bachelor of Science degree, awarded upon successful completion of this program, qualifies the graduate for State Board Examinations in Nursing. If achievement in these examinations is satisfactory, the candidate receives legal status as a registered nurse within the state.

The program is fully accredited by the Accrediting Service of the National League for Nursing.

PROGRAM SEQUENCE

FIRST YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, English Comp.	2	English 2, English Comp.	2
History 5, Mod. Europ. Civil.	3	History 6, Mod. Europ. Civil.	3
Sociology 25, Intro. to Soc.	3	Psychology 1, General	3
Chemistry 1, General	3	Chemistry 2, General	3
Mathematics 12, Functional	3	Zoology 1, Introductory	3
Nursing 1, Intro. to Nurs.	1	Nursing 2, Fund. of Nurs. I	1
Physical Education 5, 7 †	2	Speech 3, Public Speaking	2
		Physical Education 6, 8 †	2

† Not quality point credit.

SECOND YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Masterpieces of Western Literature	3	English 26, Masterpieces of Western Literature	3
Anthropology 63, Social Anthro.	3	Psychology 28, Psychology of Adjustment	3
Chemistry 33, Organic	4	Microbiology 31, Introductory	4
Zoology 37, Human Anatomy & Physiology	3	Zoology 38, Human Anatomy & Physiology	3
Home Ec. 41, Nutrition & Food Preparation	3	Nursing 26, Fundamentals of Nursing Care	4
Nursing 25, Fundamentals of Nursing II	1	Physical Education 26, 28†	2
Physical Education 25, 27 †	2		

† Not quality point credit.

SUMMER SESSION

1st Term:

Humanities Elective	3 credits
Nursing 27S—Human Development	3 credits

THIRD YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Nursing 51, Medical and Surgical Nursing 1	16	Nursing 60, Medical and Surgical Nursing II	16
		or	
		Nursing 57, Maternal and Child Nursing	16

FOURTH YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Nursing 57, Maternal and Child Nursing II	16	Nursing 60, Medical and Surgical Nursing II	16
or		*or*	
Nursing 54 and 58, Psychiatric Nursing and Public Health Nursing	16	Nursing 54 and 58, Psychiatric Nursing and Public Health Nursing	16
Nursing 95, Senior Nursing Seminar	3	Nursing 96, Senior Nursing Seminar	3

SCHOOL OF PHYSICAL EDUCATION

W. P. McGuirk, *Dean*

The School of Physical Education includes the Departments of Physical Education for Men, Physical Education for Women, Recreational Leadership, and Athletics. It offers a major in Physical Education, and in Recreational Leadership.

PHYSICAL EDUCATION FOR MEN

General Program

Each male freshman and sophomore student, unless exempted under certain conditions, must successfully complete four semesters of physical education and demonstrate his ability to swim as a requirement for his degree. The physical education requirement does not apply to those students excused by the University physician, veterans of military service, and certain transfer students.

Students may receive credit for physical education, during the sport in season, by becoming squad members of any freshman or varsity team. Freshmen who elect an athletic team sport for physical education credit must rejoin their class sections at the termination of the seasonal sport. Students may not participate in a given sport for credit for more than two semesters.

To fulfill requirements, all students must participate in three team sports, four individual activities and acquatics.

Major Program

S. W. Kauffman, *Adviser*

The major program leading to the degree of Bachelor of Science in physical education is designed to train the student for a career as a teacher of physical education. The curriculum combines both general and professional education and provides for full teacher certification for the student who has met the prescribed requirements of preparation. The program also provides for adequate training in a minor area of teaching, elected by the student, including the coaching of inter-school athletics.

PHYSICAL EDUCATION

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
P. E. 23, Principles of Health Ed.	3	Speech 3	2
Mathematics 12 or 1	3	Social Science Elective	3
P. E. 21, Intro. to Phys. Ed.	3	P. E. 22, First Aid and Safety	3
Military or Air Science 1	1	Military or Air Science 2	1
P. E. 5, Skills and Techniques (Lacrosse—Gymnastics)	1	P. E. 6, Skills and Techniques (Gymnastics—Badminton)	1
Elect One		*Elect One*	
Chemistry 1	3	Chemistry 2	3
Botany 1	3	Botany 1	3
Zoology	3	Zoology 1	3
	16		15

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Zoology 35, Physiology	3	Microbiology 31	4
P. E. 41, Anatomy	3	P. E. 42, Kinesiology	3
Psych. 1, Gen. Psychology	3	Psych. 56, Educ. Psychology	3
P. E. 35, Skills and Techniques (Soccer—Wrestling)	1	P. E. 36, Skills and Techniques (Aquatics)	1
Military or Air Science 25	1	Military or Air Science 26	1
Humanities Elective	3	Electives	3
	17		18

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Rec. Ed. 77, Org. and Adm. of Comm. Recreation	3	Psych. 65, Child Psych.	3
		Speech 91, Extempore Speech	3
P. E. 53, Phys. Ed. Elem & Second. Sch.	3	P. E. 54, Methods of Phys. Ed.	1
P. E. 57, Coaching Baseball	1	P. E. 58, Coaching Track	1
P. E. 61, Coaching Basketball	1	P. E. 60, Coaching Football	1
P. E. 59, Adaptive Phys. Ed.	3	P. E. 74, Tests and Msmts. in Phys. Ed.	3
P. E. 63, Skills and Techniques (Baseball—Basketball)	1	P. E. 64, Skills and Tech. (Game—Track)	1
Minor Electives	3-6	Minor Electives	3-6
	15-18		16-19

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ed. 52, Prin, and Meth. Teach.	3	P. E. 55, Org. & Adm. of Phys. Ed.	3
Ed. 88, Sec. Sch. Curriculum	3		
Ed. 85, Practice Teaching *	6	P. E. 76, Philos. and Prin. Phys. Ed.	3
P. E. 81, Adm. Intramural Programs	1	P. E. 78, Physiology of Exercise	3
			14

1st Semester	*Credits*
P. E. 83, Skills and Techniques (Tennis—Archery—Volleyball)	1

2nd Semester	*Credits*
Pub. Health 88, Epidemiology	3
P. E. 82, Coaching Soccer	1
P. E. 84, Skills and Tech. (Rhythmics—Golf)	1
Minor Elective	3
	17

* Ed. 85 taken during last 8 weeks of semester. All other courses listed will be accelerated during the first 7 weeks of the semester.

PHYSICAL EDUCATION FOR WOMEN

General Program

Physical Education is required of all women students during their freshman and sophomore years. The courses are planned to provide recreative activity, to improve individual skills, to develop body grace and efficiency and to increase health and vigor.

The first and second year women students are required to take three class hours a week for a total of eight credits, one for each quarter of satisfactory work.

Major Program

RUTH J. TOTMAN, *Adviser*

The major course in physical education is planned to prepare women students for professional careers. Especial attention is given to preparing teachers for elementary and secondary schools in both physical and health education. Other areas for which the graduate will qualify are teaching sports and dance in social agencies, industrial plants, civic centers and camps. A foundation will be laid for specialization in graduate study.

The curriculum gives a broad general background as well as the professional preparation. There is opportunity for individual selection in order to provide a minor.

FRESHMAN YEAR

1st Semester	*Credits*
English 1, Composition	2
Speech 3	2
Hist. 5, Mod. Europ. Civ.	3
W. P. E. 1, Intro. to P. E.	2
Math. 12 or 1	3
W. P. E. 11, Skills	1
Elective *	3

2nd Semester	*Credits*
English 2, Composition	2
Zoology 1, Introductory	3
Hist. 6, Mod. Europ. Civ.	3
W. P. E. 2, Intro. to Chld. thru P. E.	2
W. P. E. 10, Health for Adults	2
W. P. E. 12, Skills	1
Elective *	3

* Chemistry 1 and 2 are required if students have not had chemistry in high school. Others may select from Chemistry, Physics, Microbiology, or foreign language.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Psych. 1, General Psych.	3	Govt. 25, American Govt.	3
Sociology 25, Intro. to Soc.	3	Zool. 35, Vertebrate Physiol.	3
M. P. E. 41, Anatomy	3	Rec. Lead. 26, Camp Counseling	3
Music 1, Intro. to Music *or*		M. P. E. 22, First Aid & Safety	3
Art 14, Intro. to Art	3	W. P. E. 30, Aquatics	2
W. P. E. 31, Skills	1	W. P. E. 32, Skills	1

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Psych. 56, Ed. Psych.	3	W. P. E. 70, Org. & Adm. of P. E.	3
W. P. E. 73, Hist. & Prin. of P. E.	3	M. P. E. 42, Kinesiology	3
W. P. E. 63, Anal. of Rhythm	3	W. P. E. 56, Health Ed. for Elem.	
W. P. E. 53, in Elem. Schls.	3	& Sec. Schls.	3
W. P. E. 51, Skills & Teach. Meth.	2	W. P. E. 52, Skills & Teach Meth.	2
Elective	3	Electives	6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ed. 52, Prin & Meth.	3	M. P. E. 74, Tests & Measurmts.	3
Ed. 88, Secondary Schls.	3	M. P. E. 78, Physiol. of Exercise	3
Ed. 85, Practice Teach.	6	W. P. E. 96, Seminar	3
W. P. E. 83, Adaptive P. E.	3	W. P. E. 62, Skills & Teach. Meth.	2
W. P. E. 61, Skills & Teach. Meth.	2	Electives	6

RECREATION LEADERSHIP

Major Program

W. E. RANDALL, *Adviser*

The department seeks to prepare men and women for positions involving administrative, supervisory and program leadership responsibilities in municipal recreation agencies, voluntary and youth-serving agencies, hospitals, and industrial and institutional organizations.

The program is designed to provide opportunities for a general education, a knowledge and understanding of people and society, activity skills and resource knowledge, professional competency, and practical experience in various leadership situations.

In addition to completing the curriculum as described below, the student is required to:

1) attend a professional conference approved by the department;

2) participate in programming activities at the Student Union, with a scout troop, or in a similar setting approved by the department;

3) devote one summer (minimum of six weeks) to a recreation position, preferably with pay, in a camp, playground, or similar setting approved by the department.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 12, Functional Math.	3
Bot. 1, Intro. Bot.	3	Zool. 1, Intro. Zool.	3
Govt. 25, American Govt.	3	Soc. 25, Intro. to Soc.	3
Hist. 5, Mod. Europ. Civ.	3	M. P. E. 22, First Aid & Safety	3
Rec. Lead. 1, Intro. to Rec. L.	3	Rec. Lead. 2, Social Rec.	2
P. Rec. 13, Skills & Tech.	1	P. Rec. 14, Skills & Tech.	1
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Art 14, Intro. to Art *or*		Zool. 54, Natural Hist.	3
Music 1, Intro. to Music	3	Speech 76, Stage Direction	3
Rec. Lead. 25, Group Leadership	3	Psych. 1, General Psych.	3
Home Ec. 63, Arts & Crafts	3	Rec. Lead. 26, Camp Counseling	3
P. Rec. 39, Skills & Tech.	1	M. P. E. 36, Aquatics *or*	
Military or Air Science 25 (men)	1	W. P. E. 30, Aquatics	2
Elective	3	Military or Air Science 26 (men)	1

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Rec. Lead. 53, Nature Rec.	3	Rec. Lead. 56, Op. of Rec. Facil.	3
Psych. 66, Adoles. *or*		Psych. 62, Social Psych.	3
Psych. 65, Child Psych.	3	Ed. 66, Audio-visual Aids in Ed.	3
P. Health 61, Gen. & Com. Sanit.	3	P. Rec. 68, Skills & Tech.	1
P. Rec. 67, Skills & Tech.	1	Soc. 52, Rural Soc. and/or	
Soc. 51, Urban Soc. and/or		Electives *	5-7
Electives *	5-7		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Rec. Lead. 79, Practice Lead.	3	Rec. Lead. 80, Practice Lead.	3
Rec. Lead. 77, Comm. Rec.	3	Rec. Lead. 96, Concepts in Rec.	2
Soc. 75, Social Problems	3	Speech 91, Extempore Speech	3
English 51, Advanced Expository		M. P. E. 84, Skills & Tech. *or*	1
Writing	3	W. P. E.	
Electives	3-6	Electives	6-9

* Select either Sociology 51 or 52.

Department of Athletics

W. P. McGuirk, *Director;* E. E. Lorden, *Assistant Director*

The following men coach intercollegiate athletics and intramurals:

R. E. Bergquist, freshman coach of baseball and Stockbridge Basketball; L. E. Briggs, coach of varsity soccer; J. L. Cobb, assistant coach of track and director of intramural athletics; J. J. Delaney, assistant coach of football; C. B. Demers, athletic trainer; J. G. Douglas, coach of wrestling; W. Footrick, coach of track and cross country; V. H. Fusia, coach of football; R. F. Garber, coach of lacrosse; C. S. Gladchcuk, assistant coach of football and coach of golf; F. J. Glatz, assistant coach of football; R. J. James, varsity coach of gymnastics; V. A. Keedy, head athletic trainer; S. R. Kosakowski, director of Stockbridge athletics and coach of hockey and tennis; J. A. Leaman, Jr., freshman coach of basketball and soccer; E. E. Lorden, coach of baseball; R. W. O'Connell, financial manager of athletics; R. H. Page, director of sports information; B. Ricci, coach of freshman lacrosse; J. R. Rogers, Jr., coach of swimming; T. S. Schmitt, assistant football coach; M. Zunic, coach of basketball.

DEPARTMENT OF PUBLIC HEALTH

ROBERT W. GAGE, *Chairman*

Students majoring in Public Health may select divisional classification in accordance with their special interests.

The Department of Public Health offers programs leading to the Bachelor of Science degree in Environmental Health and the Bachelor of Science degree in Medical Technology. The Master of Science degree in Environmental Health is also offered.

Public Health

The curriculum in public health is designed to prepare a student for a health career. Career opportunities are open in: (1) administration of health services; (2) in basic sciences related to health; (3) in environmental health services; (4) in food and drug protective services; (5) in health education; and (6) in health information and communications.

Students electing this major should complete the following courses during their sophomore year: Chemistry 27, Physics 3 and 4, Zoology 35 and Microbiology 31.

During junior and senior years the following courses should be completed: Chemistry 33, Public Health Bacteriology 81 and 90; Public Health 61, 62, 63, 84, and 88. Students planning graduate work in sanitary engineering must take Mathematics 29 and 30 before the end of their junior year. Supporting courses in other departments will be selected with the guidance of an adviser.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3	2	Speech 3	2
Mathematics 1 or 2	3	Mathematics 4	3
Chemistry 1	3	Chemistry 2	3
Foreign language	3	Foreign language	3
Botany 1	3	Zoology 1	3
Military or Air Sci. 1 (men)	1	Military or Air Sci. 2 (men)	1
Phys. Ed. 1, 2 (men) †	2	Phys. Ed. 3, 4 (men) †	2
Phys. Ed. 5, 7 (women) †	2	Phys. Ed. 6, 8 (women) †	2

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Chemistry 27	3	Microbiology 31	4
Physics 3	4	Physics 4	4
Zoology 35	3	Humanities	3
Social Science	3	Social Science	3
Military or Air Sci. 25 (men)	1	Military or Air Sci. 26 (men)	1
Physical Ed. 25, 27 (women) †	2	Phys. Ed. 26, 28 (women) †	2
Phys. Ed. 31, 32 (men) †	2	Phys. Ed. 33, 34 (men) †	2

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Public Health 61	3	Public Health 62	3
Chemistry 33	3	Public Health 84	3
3 Electives *	9	Public Health 86 (Biostat)	2
		2 Electives *	6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Public Health 63	3	Public Health 98	3
P. H. Bacteriology 81	3	P. H. Bacteriology 90	3
Public Health 97	3	Public Health 88	3
2 Electives *	6	2 Electives *	6

* Minimum of 9 credits in social sciences and minimum of 6 credits in humanities.

JUNIOR AND SENIOR YEARS

Other Electives

Food Technology
Public Administration
Engineering Drawing
Engineering Geology
Calculus
Animal Hygiene
Elements of Meat Packing
Sanitary Engineering
Dairy Science
Planktology
Industrial Mycology
Entomology
Food Analysis
Calculus
Veterinary Science
Food Processing Engineering

Medical Technology

The curriculum in medical technology is recommended for young men and women as a profession offering a wide opportunity of occupational outlets. Medical technology graduates may be prepared for positions in medical laboratories, in federal, state and local health departments, and in commercial and research laboratories.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3, I or II	2	Speech 3, I or II	2
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1 or Zoology 1	3	Botany 1 or Zoology 1	3
Foreign language	3	Foreign language	3
Mathematics 1, Intro.	3	Mathematics 4, Intro.	3
Military (men)	1	Military (men)	1
Phys. Ed. 1, 2 (men) †	2	Phys. Ed. 3, 4 (men) †	2
Phys. Ed. 5, 7 (women) †	2	Phys. Ed. 6, 8 (women) †	2

† Not quality point credit.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Literature	3	English 26, Literature	3
Chemistry 27, Analytical	4	Microbiology 31, Intro.	4
Physics 3, Intro. (1)	4	Physics 4, Intro (1)	4
Military (men)	1	Military (men)	1
Elective (2)	3	Elective (2)	3
Elective (2)	3	Elective (2)	3
Phys. Ed. 31, 32 (men) †	2	Phys. Ed. 33, 34 (men) †	2
Phys. Ed. 25, 27 (women) †	2	Phys. Ed. 26, 28 (women) †	2

(1) Strongly recommended.

(2) One semester course in each of two social sciences.

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Microbiology 51, Deter.	3	Microbiology 52, Path.	3
Zoology 37, Anatomy- Physiol. (1)	3	Zoology 38, Anatomy- Physiol. (1)	3
Chemistry 51, Organ. (2)	4	Chemistry 52, Organ. (2)	4
Elective *	3	Elective *	3
Elective *	3	Elective *	3

(1) Zoology 35 may be substituted.

(2) Chemistry 33 may be substituted.

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Microbiology 85, Immun.	3	P. H. Bacteriology 92, Clin. (1)	3
Zoology 69, Parasit.	3	Public Health 88, Epidem.	3
Chemistry 79, Elem. Bio.	3	Chemistry 80, Clin.	2
Elective (1)	3	Elective (1)	3
Elective *	3	Elective *	3

(1) Microbiology 97, 98—independent work on special problems in micro biology—recommended.

* During Junior-Senior years—minimum of 9 credits in social sciences and minimum of 6 credits in humanities.

Following graduation the student will be assisted in arranging for a 12-month internship in an approved hospital laboratory. The student must complete all of the requirements established by the American Society of Clinical Pathologists to qualify for the Registry of Medical Technology. The courses offered by the hospital staff of the accredited affiliated hospitals are:

	Credits
Clinical Medical Bacteriology and Mycology	3-6
Serology and Immunology	3
Medical Parasitology	2-3
Clinical Hematology	3-6
Blood Groups in Man	2-3
Biochemistry of Disease	4-8
Histopathology and Clinical Microscopy	3-6

Optional Program in Medical Technology

Students may elect an optional program some time during their freshman year which will permit completion of both the requirements for the Bachelor of Science degree and one year of hospital internship required by the Registry of Medical Technology in a total of four years. This can be accomplished by scheduling the required courses listed in the four-year academic program in three academic years plus summer school sessions. After successful completion of at least 120 credits and satisfying the requirements of the Department of Public Health a student will receive a Bachelor of Science degree.

DIVISION OF MILITARY AND AIR SCIENCE

The Division of Military and Air Science includes the Department of Military Science and the Department of Air Science. No major is offered in either department.

All physically qualified male students (except veterans with over six months' active service and students transferring to the University of Massachusetts as full-time bona fide sophomores, juniors or seniors from any other institution which does not require ROTC training) who enroll in a school or college leading to an undergraduate degree at the University are required to complete the two-year basic ROTC course (Army or Air Force). Male students who are certified by the Director of the University Health Service as being not physically qualified are excused from attendance at military drill, but are not excused from attendance at Military or Air Science classes.

In making application for admission to the University conscientious objectors may apply to the President of the University for authorization to be excused from this requirement.

DEPARTMENT OF MILITARY SCIENCE (Armor)

ALBERT W. AYKROYD, *Lieutenant Colonel, Armor, Head*

The Army Reserve Officers Training Corps is the means by which young men who have taken the leadership step of coming to the state university may assure themselves that their military service is performed in commissioned status.

The first two years are basic training in leadership and citizenship. The student is informed on the position of the military in the current scene and as it relates to his future.

The second two years of ROTC are not only elective, but selective. The best qualified students are selected and are permitted to contract to continue on to a reserve commission. The Army provides these men a subsistence allowance and additional emoluments. There is a six-week summer camp training period between the junior and senior year.

Participation in ROTC has notable effect in character development. It also discloses to the army existing officer material and its potential leaders.

Successful completion of this program leads to a commission as a Second Lieutenant, U. S. Army Reserve. Active duty requirements are, at the present time, two years service with an active Army unit.

Outstanding cadets may be offered a Second Lieutenancy in the Regular Army.

FRESHMAN YEAR

1st Semester	*Credit*	*2nd Semester*	*Credit*
M. S. 11 or 12	1	M. S. 11 or 12	1

SOPHOMORE YEAR

1st Semester	*Credit*	*2nd Semester*	*Credit*
M. S. 25 or 26	1	M. S. 25 or 26	1

JUNIOR YEAR

1st Semester	*Credit*	*2nd Semester*	*Credit*
M. S. 51	2	M. S. 52	2
Academic substitute *			

SUMMER SESSION (6 Weeks)

A period of training which permits the practical application of the academic subjects presented at the institution. Included also are subjects which are not practical to teach at the institution. Normally cadets from U Mass will complete this training at Fort Knox, Kentucky.

SENIOR YEAR

1st Semester	*Credit*	*2nd Semester*	*Credit*
M. S. 75	2	M. S. 76	2
Academic substitute *			

* The academic substitute is one university course in either the first or second semester from a list of subjects approved by the Military Department.

DEPARTMENT OF AIR SCIENCE

JOHN C. MARCHANT, *Colonel, U. S. A. F., Head*

The mission of the department program is to develop in selected college students, through a permanent program of instruction, those qualities of leadership and other attributes essential to their progressive advancement to positions of increasing responsibility as commissioned officers in the United States Air Force. It is not expected that all so commissioned will select the U. S. A. F. as a career; nevertheless, the program does offer an excellent means to prepare for such a career.

The first two years of instruction, the basic course, give a foundation for leadership and air and space age citizenship. The program of the last two years, advanced Air Force ROTC and four weeks of summer training a tthe end of the junior year, is designed primarily to enhance the professional knowledge and leadership capabilities of those qualified and selected for officer training.

All students planning to take advanced Air Force ROTC in their junior and senior years should complete Psychology 1 (prerequisite

to Psychology 62) prior to entering the second semester of their junior year. The following courses are required for completion of advanced Air Force ROTC:

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credit*
One of the following:*		Air Science 12, Foundations of	
English 1 or 2	2	Air Power I	1
Mathematics 1, 2, 4, 5 or 6	3		
Speech 3	2		
Chemistry 1, 2, 3, or 4	3-4		
Air Science 11, Leadership Laboratory †	1		

SOPHOMORE YEAR

1st Semester	*Credit*	*2nd Semester*	*Credits*
Air Science 25, Foundations of Air Power II	1	One of the following:*	
		English 25 or 26	3
		Psychology 1	3
		Economics 25 or 26	3
		Sociology 25	3
		Air Science 26, Leadership Laboratory †	1

† Not quality point credit.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Speech 91, Public Speaking	3	Psychology 62, Social Psychol. II	3
Air Science 51, The Military Justice System	1	Air Science 52, Staff Organization and Military Management	1

SUMMER (4 Weeks)

Summer Training Unit

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Government 53, International Relations	3	Geography 81, World Political Geography	3
Air Science 77, Principles and Problems of Military Leadership	1	Air Science 76, The Air Force Officer	1

* Other substitutions may be authorized by the Department of Air Science.

RELIGION

CHAPLAINS POWER, RUCHAMES, AND SEELY, *Advisers*

Although there is no department of religion at the University of Massachusetts, students interested in pursuing religion as an academic discipline have certain opportunities, both in curricular and co-curricular ways.

In the formal curriculum, courses are offered by several departments in the College of Arts and Sciences. Credit courses in history, such as those covering the ages of medieval civilization and of the Reformation, for example, afford systematic study into the religious institutions and movements of those periods. Similarly, those offered by the philosophy department in the Philosophy of Religion and in Oriental Philosophies provide a critical and constructive study of basic issues, in both the contemporary western world and Asia. Also, certain courses in other departments deal with matters of religion.

In addition to curricular work, students may learn from co-curricular programs of an academic nature offered by the Chaplains and the campus religious organizations. Each year classes (non-credit) are taught by the Chaplains and invited lecturers on topics such as Basic Beliefs and Practices of Judaism, Catholic Faith and Practices, Essentials of Protestant Christianity. Classes in Hebrew and Yiddish, study groups on various problems in campus living, and workshops on personal relations are also open to students.

The B'nai B'rith Hillel Foundation, the Christian Association, and the Newman Club frequently bring to the campus lecturers and scholars of national and international repute to speak at open meetings. Distinguished scientists, journalists, and government officials, as well as theologians and religious leaders, have come as guests of the religious organizations, and some provide leadership for large-scale events such as retreats, the Religious Embassy, and holy day observances. Lectures on religion are occasionally offered in a series of three or more under the leadership of well-known scholars and teachers. The educational and cultural programs of the campus religious organizations are open to all who are interested.

DIRECTORY OF COURSES

AGRICULTURAL AND FOOD ECONOMICS

Head of Department: Professor John Blackmore. Professors Crossmon, Leed, Westcott; Associate Professors Fitzpatrick, Russell; Assistant Professors Callahan, Foster, Lee, Marion.

AGRICULTURAL ECONOMICS

26. (II) Basic Business Decisions in Agriculture

The application of methods of economic analysis to the production and other decision-making problems of the farm and agricultural firm. 3 class hours. Credit, 3. Mr. Fitzpatrick.

55. (I) Principles of Agricultural Marketing

The economic foundations of marketing; price determination, competitive situations, the role of government in agricultural marketing. 3 class hours. Credit, 3. Mr. Fitzpatrick.

58. (II) Agricultural Policy

Concepts of policy; how farm policy is made; farm policy problems and their economic foundations; consequences for farmers, consumers, and taxpayers. 3 class hours. Credit, 3. Staff.

71. (I) Economic History of U. S. Agriculture

The development of agriculture with emphasis on interregional competition, agricultural policy, and the changing position of the farmer in the national economy. 3 class hours. Credit, 3. Mr. Lee.

75. (I) Farm Business Management

Practical application of economics to the decision problems of farm operators; techniques for studying alternative solutions to farm management problems; planning production systems; using business records in farming. 3 class hours. Credit, 3. Mr. Crossmon.

76. (II) Advanced Farm Business Management

Economic analysis of decision problems of case farms. Students make analyses of selected farms. Prerequisite: Ag. Ec. 75. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Crossmon.

78. (II) Land and Water Economics

Economic and institutional factors affecting land and water use; land use planning; future needs and public control of land and water; conservation economics; economics of recreation. 3 class hours. Credit, 3. Mr. Foster, Mr. Blackmore.

95. (I) 96. (II) Seminar in Agricultural Economics

For seniors. The study of current developments in agricultural economics; preparation, presentation and discussion of analyses of typical problems. 2 class hours. Credit, 2. Staff.

97. (I) 98. (II) Special Problems in Agricultural Economics

For seniors. The analysis of particular problems in farm management or marketing; provides advanced training in an area of special student interest. 3 class hours. Credit, 3. Staff.

FOOD ECONOMICS

1. (I) The World's Food Supply

Introduction to the world's agriculture and food industries; geography and economics of food production; special problems in U. S. agricultural policy; world food and population problems. 2 class hours. Credit, 2. Mr. Blackmore.

75. (I) Food Merchandising

Principles of food merchandising; merchandising trends; retail store layout and product location; food store inventory control; emphasis on merchandising of perishables such as dairy, poultry products, meat, and produce. 3 class hours. Credit, 3. Mr. Marion.

78. (II) Food Marketing

A critical analysis of the food industry; applications of economics analysis to the problems of industry and firms; management of food distribution firms; competition in food marketing; factors affecting costs and profits. 3 class hours. Credit, 3. Mr. Leed.

95. (I) 96. (II) Seminar in Food Distribution

Presentation of analyses of topics of interest to students of Food Distribution. 2 class hours. Credit, 2. Staff.

97. (I) 98. (II) Special Problems in Food Distribution

For seniors. Advanced work on problems of special interest; application of principles acquired in other course work to practical problems of food marketing firms. Credit, 3. Staff.

STATISTICS

77. (I) (II) Elementary Experimental Statistics

Covers basic concepts and techniques for determining reliability and significance of small samples. Confidence limits: X^2, t, and F tests, and simple regression and correlation. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Russell.

79. (I) (II) Elementary Economic Statistics

Covers charting, tables, frequency distribution, central tendency, dispersion, basic concepts of reliability and significance of small samples, index numbers, simple regression and correlation and time series analysis. 3 class hours; optional laboratory and discussion periods. Credit, 3. Mr. Russell.

80. (II) Advanced Statistics

Linear and curvilinear multiple correlation analysis. Machine and short-cut graphic methods are used. Some time devoted to probability and analysis of variance. 2 2-hour periods. Credit, 3. Mr. Russell.

AGRICULTURAL ENGINEERING

Head of Department: Professor R. W. Kleis, Professor Clayton, Professor Fitzgerald; Associate Professors C. Johnson, Norton, Perry, Zahradnik; Assistant Professors Pira, Whitney; Messrs. Collins, Odden, E. Johnson.

51. (I) House Planning

Space arrangement, construction materials, construction problems and discussions, utilities, financing, maintenance and remodeling. Particular emphasis on planning and evaluation procedures and factors. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. C. Johnson.

53. (I) Food Service Facilities Planning

Space organization and equipment layouts; discussions and planning relative to facilities, utilities and materials handling. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. E. Johnson.

55. (I) Farm Shop

Instruction and practice in use of tools and power equipment; carpentry, welding, sheet metal forming, and concrete work; materials, skills, practices and safety consideration. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Pira.

72. (II) Drainage and Irrigation

The engineering factors of drainage and irrigation; study of various system types and design of systems; problems of flow and run-off. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. E. Johnson.

75. (I) Farm Structures and Related Equipment

Fundamental aspects of planning modern farm structures with emphasis on functional design, environmental control and integration of mechanical equipment. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Clayton.

76. (II) Mechanization in Crop Production

Principles of operation, maintenance, and selection of farm tractors and field machinery; also of irrigation and drainage systems and equipment. Emphasis on management practices and discussions. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Whitney.

81. (I) Elements of Food Process Engineering I

Study of fundamental principles involved in the application of unit operations to food processing including selection, management and operation of processing units and instrumentation. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zahradnik.

82. (II) Elements of Food Process Engineering II

Continuation of Agricultural Engineering 81; a study of the processing of raw materials, including mixing, heating, cooling, evaporating, distilling, dehydration and drying. Prerequisite, Agricultural Engineering 81. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zahradnik.

AGRONOMY

Head of Department: Professor William G. Colby; Assistant Professor Michelson, Southwick, Troll, Vengris, Zak; Mr. Waddington.

22. (II) Soils

Fundamentals of soil science covering development, properties and management of soils and the interrelationship of soils to plant growth. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zak.

51. (I) Field Crops

Production and management of the major field crops of the United States including varieties, varietal improvement, cultural practices, harvesting practices and storage. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Southwick.

52. (II) Forage Crops

An analysis of the basic principles involved in the establishment, fertilization, and management of forage grasses and legumes. 3 class hours. Credit, 3. Mr. Colby.

53. (I) Agrostology

Study of the factors influencing the successful establishment and maintenance of turf grasses used on lawns, sports, highways, airports, and cemeteries. Given in alternate years. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Troll.

56. (II) Agrostology

Business aspects of fine turf management including work schedules, budget planning, labor management and selection of equipment and supplies. Given in alternate years. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Troll.

57. (I) Soil Formation

The development of soils as related to physical, chemical, biological, climatic and geological factors. 3 class hours. Credit, 3. Mr. Southwick.

59. (I) Soil-Plant Mineral Nutrition

Mineral nutrients in the growth of crop plants; the use of fertilizers and other soil amendments; soil reaction; mineral deficiencies and toxicities in plants. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Zak.

65. (I) Weed Control

Weed infestation, common weeds, identification and principles of control. Special emphasis on the chemical control of weeds. Prerequisites, Chemistry 1, 2 and Botany 1. 3 class hours. Credit, 3. Mr. Vengris.

79. (I) Soil Physics

The behavior of the soil mass related to particle size and distribution; colloids; water-liquid and vapor transfer; gas diffusion; heat-sources, capacity, and conductance. 1 class hour, 2 2-hour laboratory periods. Credit, 3.

84. (II) Soil Chemistry

The inorganic and organic chemical reactions related to nutrient supply in soils and soil nutrition of plants. Colloidal aspects of soil chemical reactions and soil-plant interrelationships. Prerequisites, Chemistry 29, Botany 68, Agronomy 57. 3 class hours. Credit, 3.

84B. (II) Soil Chemistry Laboratory

Methods and techniques used in soil chemistry research and in plant science investigations. Cation exchange capacity, exchangeable cations, and soil phosphate by flame photometry and spectrophotometry. Prerequisites, Chemistry 29, 30, Botany 68, Agronomy 57. 2 3-hour laboratory periods. Credit, 2.

97. (I) 98. (II) Special Problems in Agronomy

For seniors specializing in agronomy. Designed to acquaint students with agronomic research methods and procedures. 3 2-hour laboratory periods. Credit, 3. Staff.

ART

Head of Department: Professor Paul F. Norton. Associate Professor Matheson; Miss Damm, Messrs. MacIver, Townsend.

14. (I) and (II) Introduction to Art

An introduction to great works of art studied in historical sequence, including techniques and aesthetic principles. 3 class hours. Credit, 3.

31. (I) and (II) Basic Design

Introduction to the elements and principles of design and their imaginative application to visual presentation. 6 studio hours. Credit, 3.

32. (I) and (II) Basic Design

Continuation of Art 31. With more attention given to three-dimensional design. Prerequisite, Art 31. 6 studio hours. Credit, 3.

33. (I) and (II) Basic Drawing

Introduction to drawing in black and white, applying pencil, crayon, charcoal techniques to representation in line and tone, emphasizing sound observation and effective presentation. 6 studio hours. Credit, 3.

34. (I) and (II) Advanced Drawing

Continuation of Art 33. Investigation of creative possibilities of pen and ink, brush and other black and white techniques. Prerequisite, Art 33. 6 studio hours. Credit, 3.

51. (I) and (II) Water Color

Initial concentration on transparent water color, emphasizing control of techniques and mastery of color relationships. Further experience with opaque water color, such as gouache, casein. Prerequisites, Art 31, 33. 6 studio hours. Credit, 3.

52. (I) and (II) Water Color

Continuation of Art 51, Prerequisite, Art 51. 6 studio hours. Credit, 3.

53. (I) and (II) Oil Painting

Easel painting in oil and related media, based on elementary understanding of physical properties of medium, and encouraging individual directions within limitations of sound composition. Prerequisites, Art 31, 33. 6 studio hours. Credit, 3.

54. (I) and (II) Oil Painting

Continuation of Art 53. Prerequisite, Art 53. 6 studio hours. Credit, 3.

57. (I) and (II) Printmaking

Basic study of materials, techniques, aesthetic considerations peculiar to graphic media of lithography and intaglio (etching, aquatint, etc.), permitting students to print their own work. Prerequisites, Art 31, 34 or permission of instructor. 6 studio hours. Credit, 3.

58. (I) and (II) Printmaking

Continuation of Art 57. Prerequisite, Art 57. 6 studio hours. Credit, 3.

60. (I) and (II) Sculpture

Experimentation with materials. Investigation into the nature of 3-dimensional form. The development of 3-dimensional order. Individual projects. Prerequisites, Art 31, 33. 6 studio hours. Credit, 3.

61. (I) and (II) Sculpture

Continuation of Art 60. Prerequisite, Art 60. 6 studio hours. Credit, 3.

65. (I) Ceramics

The designing and making pottery with the potter's wheel and related tools. A student should have taken one or more basic courses in creative art before this course. 3 class hours. Credit, 3.

71. (I) Ancient Art & Archaeology

The art of early cultures, mainly in the European region, including Greek and Roman sculpture and painting. Students are encouraged to take Art 14 before this course. 3 class hours. Credit, 3.

73. (I) Mediaeval Art

Earliest phases of Christian art in catacombs, barbaric influences of northern Europe, Byzantine developments in the East, and the Romanesque and Gothic in the West. Students are encouraged to take Art 14 before this course. 3 class hours. Credit, 3.

75. (II) Renaissance Art

Painting, sculpture, architecture, with particular attention given to Italian Art. Emphasizes social and historical importance of arts, and changes in style and aesthetic theory. 3 class hours. Credit, 3.

76. (II) Baroque Art

The Art of the 17th and early 18th centuries in Italy, Spain, Germany, France and the Low Countries. It is advisable for students to take Art 14 before this course. 3 class hours. Credit, 3.

77. (I) American Art

Study of earliest Colonial art and architecture, the impact of later European influences; regional art of the late 19th and 20th centuries, and contemporary phases of abstract art. 3 class hours. Credit, 3.

79. (II) Modern Painting and Sculpture

Origin of modern movements in art, and an analysis of contemporary techniques and styles as they relate to society. 3 class hours. Credit, 3.

81. (I) Modern Architecture

History of the changes in style, technical advances, and aesthetic principles during the past two hundred years. 3 class hours. Credit, 3.

ASTRONOMY

Astronomy is a Joint Department of the four colleges: Amherst, Mount Holyoke, Smith, and the University. ASTFC means "Astronomy Four-Colleges."

Head of Department: Associate Professor Albert P. Linnell. Associate Professor Yoss; Assistant Professors Koch, Olson.

1. (I) Elementary Astronomy (ASTFC 1)

The solar system, systems of coordinates, laws of motion, planets and satellites, the sun. Supplemented by occasional hours of evening observation. Prerequisite, high school trigonometry. 3 class hours. Credit, 3.

2. (II) Elementary Astronomy (ASTFC 1)

The astronomical universe. Stellar distances and motions, star clusters and nebulae. Supplemented by occasional hours of evening observation. Prerequisite, Astronomy 1. 3 class hours. Credit, 3.

24. (II) Development of Astronomy (ASTFC 24)

The progress of astronomy through the work of great men. The development of important ideas in the field from ancient to modern times. Prerequisite, Astronomy 2. 3 class hours. Credit, 3.

51. (I) Statistical Astronomy (ASTFC 31)

Stellar motions as derived from trigonometric, spectroscopic, and statistical parallaxes, proper motions, and radial velocities. Stellar luminosity functions, and related topics. Prerequisites, Astronomy 2; Physics 7 or 26; Mathematics 29 previously or concurrently. 3 class hours. Credit, 3.

52. (II) Galactic Structure (ASTFC 32)

Properties of the galactic system revealed by star clusters, the general distribution of stellar types, and the interstellar medium. Kinematics and dynamics of galactic motion. Recent results from the field of radio astronomy. Prerequisites, Astronomy 2; Physics 7 or 26; Mathematics 30 previously or concurrently. 3 class hours. Credit, 3.

65. (I) Celestial Mechanics (ASTFC 33)

Development of the two body problem and the restricted three body problem as applied to the solar system and stellar systems. Prerequisites, Astronomy 2; Mathematics 30; Physics 7 or 26. 3 class hours. Credit, 3.

66. (II) Double Stars

Analysis of the orbits of double stars and discussion of their physical characteristics. Prerequisites, Astronomy 2; Mathematics 30; Physics 7 or 26. 3 class hours. Credit, 3.

75. (I) Astrophysics (ASTFC 41)

Introduction to the theory of atomic spectra as applied to the analysis of stellar atmospheres. Transfer of radiation, determination of temperatures, pressures, and abundances. Prerequisites, Physics 7 or 26, Mathematics 30. 3 class hours. Credit, 3.

76. (II) Astrophysics (ASTFC 42)

Gas laws and nuclear reactions as applied to the structure of stellar interiors. Evolution of stars. Prerequisites, Physics 7 or 26; Mathematics 30. 3 class hours. Credit, 3.

81. (I) Laboratory Astronomy (ASTFC 39)

Study and development of observing procedures. Analysis of astronomical observations. Prerequisites, Astronomy 2; Physics 7 or 26; Mathematics 30. 1 hour lecture, 4 hours laboratory. Credit, 3.

95. (I) 96. (II) Seminar

An individual research project approved by the department. Prerequisite, Consent of the department. Credit, 3.

BOTANY

Head of Department: Professor D. S. Van Fleet. Professors Livingston, Schuster; Associate Professors Davis, Gentile; Assistant Professors Bigelow, Putala, Rowley, Wilce; Mrs. Bigelow, Mr. Bryant.

1. (I) and (II) Introductory Botany

Structure, function and reproduction of plants, dealing primarily with the flowering plants. Basic biological principles are emphasized. 2 class hours, 1 3-hour laboratory period. Credit, 3. The Staff.

25. (I) The Plant Kingdom

A general survey of the morphology, reproduction, distribution and importance of the slime molds, bacteria, algae, fungi, lichens, liverworts, mosses, ferns and seed plants. Prerequisite, Botany 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Davis.

26. (II) New England Flora

Identification of tracheate plants (lycopods, horsetails, ferns, gymnosperms, angiosperms) and the families they represent. Prerequisite, Botany 1, Botany 25 recommended. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rowley.

57. (I) Plant Anatomy and Histological Methods

Study of origin and structure of vegetative and reproductive organs of seed plants coordinated with exercises in preparation of stained slides for microscopic studies. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Putala.

59. (I) The Angiosperms

The evolution and systematics of flowering plants, emphasizing families and their relationships. Prerequisite, Botany 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Schuster.

60. (II) Morphogenesis

The development of plant form and structure at the level of cells and organs. Illustrations drawn from controlled experiments on the contribution of internal and external factors. Prerequisite, Botany 1. 2 class hours, 1 2-hour laboratory-discussion period. Credit, 3. Mr. Davis.

61. (I) Phycology

The phylogeny, taxonomy, morphology and ecology of the major groups of the marine and fresh water algae. Field work in marine and fresh water environments. Prerequisite, Botany 25. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wilce.

62. (II) The Archegoniates

The morphology, evolution and systematics of bryophytes, ferns and their allies. Prerequisite, Botany 25. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Schuster.

66. (II) General Mycology

Survey of the various fungi, their life history and distribution, their significance in disease, their utilization by man. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Bigelow.

67. (I) Introductory Plant Physiology

Plant processes and their relation to the complex of activity constituting plant growth. Topics include water relations, photosynthesis, fat and protein synthesis, digestion, translocation and respiration. Prerequisites, Botany 1, Chemistry 1 and 2. Recommended, Chemistry 33 or equivalent. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Gentile.

68. (II) Plant Metabolism (1961-62)

A study of the chemical operation of plants, emphasizing the enzymatic processes involved in the synthesis and breakdown of the more important chemical constituents of plants. Offered in alternate years. Prerequisites, Botany 67, Chemistry 33 or equivalent. 2 class hours, 1 4-hour laboratory period. Credit, 4. Mr. Gentile.

80. (I) Aquatic Vascular Plants

Systematics, ecology and fundamental importance of aquatic plants. A course designed for majors in Botany, Zoology, and Wildlife. Prerequisites, Botany 1, 26. 2 3-hour class-laboratory periods. Credit, 3. Mr. Wilce.

81. (I) Plant Ecology

Interrelationships between plants and their environment, with special emphasis on the structure and development of plant communities. Prerequisite, Botany 1; Botany 26 and 67 recommended. 2 3-hour class-laboratory periods. Credit, 3. Mr. Livingston.

82. (II) Plant Geography

Principles governing the development and natural distribution of plants and plant communities with special consideration of the vegetation of North America. Prerequisite, Botany 18. 3 class hours. Credit, 3. Mr. Livingston.

84. (I) Autecology

Plant behavior in relation to the physical and biological environment, with emphasis on the ecology of individual plants. Prerequisites, Botany 67 and 81. 2 3-hour laboratory-discussion periods. Credit, 3. Mr. Livingston.

89. (I) Developmental Plant Cytology

Emphasis on development of plant cell walls, plastids and mitochondria; introduction to fine structure of cytoplasmic and nuclear components and ontogenetic and phylogenetic development of plant cell structures. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rowley.

97. (I) 98. (II) Special Problems

Supervised problem work for qualified students. Hours by arrangement. Credit, 1-3. The Staff.

BUSINESS ADMINISTRATION

ACCOUNTING

Chairman of Department: Associate Professor John W. Anderson, Associate Professors Lentilhon, Singer; Assistant Professors Fitzgerald, Krzystofik, Stanhope.

25. (I) and (II) Introduction to Accounting I

An introduction to the principles underlying the collection, recording, and interpretation of accounting data. 3 class hours. Credit, 3. Staff.

26. (I) and (II) Introduction to Accounting II

A continuation of Accounting 25 with major emphasis on accounting for corporations, partnerships and manufacturers. Prerequisite, Accounting 25. 3 class hours. Credit, 3. Staff.

27. (I) Introduction to Accounting

A one semester course to combine the coverage of Accounting 25 and 26. 5 class hours. Credit, 5. Mr. Singer, Mr. Stanhope.

61. (I) Intermediate Accounting

Theoretical concepts and practical procedures for presentation of financial information based on a study of current accounting literature. Emphasis is on the development of analytical ability through use of cases and problems. Prerequisites Accounting 26 or 27. 4 class hours. Credit, 4. Mr. Fitzgerald, Mr. Stanhope.

62. (II) Advanced Accounting

A continuation of Accounting 61 with principal emphasis on the funds statement, accounting for partnerships and an introduction to consolidated financial statements. Prerequisite, Accounting 61. 4 class hours. Credit, 4. Mr. Singer.

63. (I) and (II) Cost Accounting

Basic principles of cost accounting with emphasis on the determination and control of unit costs for materials, labor and overhead under the Job Order and Process costs systems. Prerequisite, Accounting 26 or 27. 3 class hours. Credit, 3. Mr. Krzystofik, Mr. Lentilhon.

64. (II) Advanced Cost Accounting

A continuation of Accounting 63 with emphasis on budgetary control; standard, estimated and direct costs; and cost analyses for control and decision-making. Prerequisite, Accounting 63. 3 class hours. Credit, 3. Mr. Lentilhon.

72. (II) Administrative Accounting and Control

A case-study approach to the significance of quantitative data for decision making. 3 class hours. Credit, 3. Mr. Singer.

73. (I) and (II) Federal Income Tax Procedure

A study of federal income tax laws and regulations as they affect individuals; the preparation of tax returns. Prerequisite, Accounting 25 or 27. 3 class hours. Credit, 3. Staff.

74. (II) C.P.A. Problems

Extensive practice in solution of problems from C.P.A. examinations. Topics covered include governmental and institutional accounting, estates, trusts, receiverships, liquidations and consolidations. Prerequisite, Accounting 62. 3 class hours. Credit, 3. Mr. Anderson.

77. Auditing and Internal Control

Basic principles of auditing with emphasis on theory, types of audits, duties and responsibilities of the auditor, audit programs and methods of internal control. A complete audit is developed through the use of an audit case. Prerequisites, Accounting 62 and 63. 3 class hours. Credit, 3. Mr. Krzystofik.

78. (II) Advanced Federal Tax Procedures

A continuation of Accounting 73 emphasizing corporations, partnerships, estates and trusts, gifts and estate taxes. Prerequisite, Accounting 73. 3 class hours. Credit, 3. Mr. Anderson.

90. (II) Theory of Accounts

The study of literature dealing with agreed and controversial criteria for collecting and reporting financial information. Prerequisite, Permission of the instructor. 3 class hours. Credit, 3. Mr. Singer.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

GENERAL BUSINESS AND FINANCE

Acting Chairman of Department: Associate Professor Rudolph H. Kyler. Chairman of Department: Professor James B. Ludtke.* Associate Professors Cheng, Rivers, Smart; Assistant Professor Burak; Visiting Lecturer Surrey.

GENERAL BUSINESS

65. (I) Principles of Transportation

The development and growth of transportation as a function of production and distribution of goods; rate structures and transportation laws as they affect the relationships between carriers and shippers. 3 class hours. Credit, 3. Mr. Rivers.

66. (II) Traffic Management

The relationships and responsibilities among carriers, regulatory authorities and users of transportation services. Prerequisite, Gen. Bus. 65 and consent of instructor. 3 class hours. Credit, 3. Mr. Rivers.

67. (I) Public Utilities

The nature, organization and administration of regulated industries; aspects of public regulation at Federal, State and Local levels as the affect service operations. 3 class hours. Credit, 3. Mr. Rivers.

68. (II) Real Estate

A comprehensive survey of real estate principles and practices; the mechanics of the real estate market and the economic and legal factors that influence it. 3 class hours. Credit, 3. Mr. Burak.

71. (I) and (II) Business Law I

The law of contract and sales. 3 class hours. Credit, 3. Mr. Burak, Mr. Smart, Mr. Surrey.

72. (II) Business Law II

The law of agency and negotiable instrument and time permitting, bankruptcy and wills. The students may register for either General Business 72 or 73. Prerequisite, Gen. Bus. 71. 3 class hours. Credit, 3. Mr. Smart.

73. (I) Business Law III

The law of partnerships, corporations and property. Prerequisite, Gen. Bus. 71. 3 class hours. Credit, 3. Mr. Smart.

78. (II) Administrative Statistics

Probability and statistical distributions applied to business management problems. Application of Bayes' theorem to sampling for business decision-making under uncertainty. Business forecasting and time series analysis. 3 class hours. Credit, 3. Mr. Cheng.

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* On leave of absence.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

FINANCE

55. (I) and (II) Financial Institutions

Our country's financial system and the functional relationships between financial institutions and the economic activities of households, business firms and governmental units. Prerequisites, Economics 25 and Accounting 25 or consent of Instructor. 3 class hours. Credit, 3. Staff.

65. (I) and (II) Corporation Finance

Social significance of corporate financial behavior, internal administration and control, expansion, capital-re-adjustment, and social control. Prerequisite, Accounting 25 or consent of instructor. 3 class hours. Credit, 3. Mr. Burak, Mr. Cheng, Mr. Rivers.

75. (I) Principles of Insurance

Risks encountered by individuals and business firms and the methods and institutions which have been established to insure against financial losses. The various forms of insurance are studied primarily from the buyers' point of view. 3 class hours. Credit, 3. Mr. Kyler.

76. (II) Life Insurance

The application of life insurance to the problems of family security, business security, investments, and estate protection. 3 class hours. Credit, 3. Mr. Kyler.

81. (I) Problems of Business Finance I

Short and intermediate-term financing; decision-making under uncertainty regarding needs and sources of funds. Prerequisite, Finance 65. 3 class hours. Credit, 3. Mr. Cheng.

82. (II) Problems in Business Finance II

Long term financing, capital budgeting, reserves and dividend policy, pensions, company expansion, merger and consolidation, reorganization. Prerequisite, Finance 65. 3 class hours. Credit, 3. Mr. Cheng.

83. (I) Investments

The development of a general theory of investment management and its application to individual and institutional investors. Prerequisites, Finance 35 and Finance 65 or consent of instructor. 3 class hours. Credit, 3. Mr. Cheng.

84. (II) Security Analysis

Examination of factors affecting investment values of securities and the methods used in their analysis. Prerequisite, Finance 83. 3 class hours. Credit, 3, Mr. Ludtke.

MANAGEMENT

Chairman of Department: Associate Professor John T. Conlon. Professor O'Donnell; Associate Professor Claunch; Lecturer T. Johnson; Mr. Elkins.*

61. (I) and (II) Principles of Management

The basic course dealing with the fundamental principles and practices of the managerial process in business enterprises. 3 class hours. Credit, 3. Mr. Claunch, Mr. T. Johnson.

64. (I) and (II) Personnel Management

The principles and policies followed by management in the procurement, development, direction and control of personnel. 3 class hours. Credit, 3. Mr. Conlon, Mr. T. Johnson.

67. (I) Management-Union Relations I

A comparison of union-management objectives, functions and structures, including the scope and impact of union penetration into areas of managerial authority. Prerequisites, Management 61, 64, or Economics 79. 3 class hours. Credit, 3. Mr. Conlon.

68. (II) Management-Union Relations II

The problems involved in the interpretion and administration of collective bargaining agreements are studied by use of the case method of analysis. Prerequisite, Management 67 or consent of instructor. 3 class hours. Credit, 3. Mr. Conlon.

81. (I) Theory of Business Administration

Principles of administration; modern organization theories; specialization, functionalization, coordination, planning, and control; authority, status, leadership, decision-making, communication, and power-structuring. Prerequisite: Management 61. 3 class hours. Credit, 3. Mr. O'Donnell.

85. (I) Management of Production I

The principles and analytical techniques of modern production management. The design, operation, and control of manufacturing and other man-machine systems. Prerequisites, Management 61 and Statistics 79. 3 class hours. Credit, 3. Mr. Claunch.

86. (II) Management of Production II

Cases and specific applications of the principles of production management. Prerequisite, Management 85. 3 class hours. Credit, 3. Mr. Claunch.

92. (II) Problems of Management

An integrating course dealing with the problems of management embracing the organic and management functions, using cases for analysis and systematic decision-making practice. Prerequisites, Management 61, 81, 85. 3 class hours. Credit, 3. Mr. O'Donnell.

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* On leave of absence.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

MARKETING

Chairman of Department: Professor Harold E. Hardy. Assistant Professors Drew-Bear, Zane; Mr. Johnson.

53. (I) Marketing Principles

The problems involved in the distribution of industrial and consumer goods including wholesaling, retailing and sales promotional activities. 3 class hours. Credit, 3. Staff.

54. (II) Salesmanship and Sales Management

The principles and practices of selling; the management of sales personnel and the control of sales operations. 3 class hours. Credit, 3. Mr. Johnson.

62. (II) Marketing Research

The aims, sources and fact-gathering methods of marketing research activities. Individual case study and research projects. 3 class hours. Credit, 3. Mr. Drew-Bear.

71. (I) Retail Merchandising

The principles of retailing with case studies of retail management problems. 3 class hours. Credit, 3. Mr. Drew-Bear.

73. (I) Advertising

The techniques and media of advertising, its services to business and the organization and economic functions of the advertising industry. 3 class hours. Credit, 3. Mr. Hardy.

74. (II) New England Markets

Individual and group study of New England Markets and the marketing problems of New England industrial enterprises. 3 class hours. Credit, 3. Mr. Zane.

75. (I) Credits and Collections

The principles and practices of mercantile and retail credit management including the sources and analysis of credit information, collections procedures and control and the rights of creditors. 3 class hours. Credit, 3. Mr. Johnson.

76. (II) Purchasing

The purchasing organization and practices of industrial enterprises. 3 class hours. Credit, 3. Mr. Zane.

79. (I) Wholesaling

A study of wholesale marketing with emphasis on the marketing activities of manufacturers and wholesale middlemen in the industrial goods area. 3 class hours. Credit, 3. Mr. Zane.

80. (II) Problems in Marketing

The interrelations between research planning and the execution of sales programs with case studies showing the effects of various marketing policies upon individual firms. Prerequisite, Marketing 53. 3 class hours. Credit, 3. Mr. Drew-Bear.

84. (II) Problems in Advertising

Application of basic marketing knowledge in planning and analyzing advertising campaigns, research appropriations, the determination of the advertising budget and the choice of media and the subsequent measurement of effectiveness. Prerequisites, Marketing 53 and 73. 3 class hours. Credit, 3. Mr. Hardy.

86. (II) Problems in Retailing

Case analysis and decision covering pricing; merchandise management; buying and selling policies; store systems; personnel; accounting control; plant operation. Prerequisite, Marketing 53. 3 class hours. Credit, 3. Mr. Drew-Bear.

97. (I) 98. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the Chairman of the Department. Credit, 1-3. Staff.

CHEMISTRY

Head of Department: Professor William E. McEwen.* Professors Cannon, Hunsberger, Little, Smith, Stein; Associate Professors Carpino, Richason, Roberts; Assistant Professors Chandler, George, McWhorter, Oberlander, Proctor, Robinson, Stengle, Stidham, Williams, Zajicek; Mrs. Fessenden, Miss Kendrow, Mrs. Parkinson, Messrs. Rowell and Wynne.

1. (I) 2. (II) General Chemistry

A study of the fundamental chemical laws and theories, with the object of giving the student a sound scientific training through a course in chemistry. 2 class hours; 1 quiz hour; 1 2-hour laboratory period. Credit, 3. Mr. Richason and Staff.

3. (I) 4. (II) General Inorganic Chemistry

A study of the fundamental chemical laws and theories, and including the elements of qualitative analysis. For students planning to major in chemistry and others for whom the course is a departmental requirement. 2 class hours; 2 3-hour laboratory periods. Credit, 4. Mr. Richason and Staff.

25. (I) 26. (II) Principles of Chemistry

For students who qualify by examination. A study of fundamental laws and theories including the theory and practice of qualitative and quantitative methods of analysis. 2 class hours, 6 laboratory hours. Credit, 4. Mr. Smith, Mr. Richason, Mr. Zajicek.

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* As of September 1, 1962.

27. (I) Analytical Chemistry

A broad look at the principles of analytical chemistry, for students not majoring in chemistry. Basic laboratory techniques and operations of quantitative analysis. Not acceptable for major credits except by special arrangement. Prerequisite, Chemistry 2 or 4. 2 lectures, 2 3-hour laboratory hours. Credit, 4. Mr. Roberts, Mr. Proctor.

29. (I) and (II) Qualitative Analysis

The fundamental principles of ionic equilibria and the chemistry of important cations and anions, with particular reference to semimicro qualitative analysis. Prerequisite, Chemistry 2 or 4. 2 class hours, 6 laboratory hours. Credit, 4. Mr. Smith, Mr. Wynne.

32. (II) Quantitative Chemical Analysis

A detailed study of the principles and practices of titrimetric and gravimetric analysis; separation methods; introduction to physical methods. Primarily for chemistry majors and others needing a more detailed treatment than is given in Chemistry 27. Prerequisite, Chemistry 29. 2 lectures, 2 4-hour laboratory periods. Credit, 4. Mr. Roberts, Mr. Proctor.

33. (I) and (II) Organic Chemistry

A short course intended to satisfy the requirements in this field for all students who do not specialize in chemistry. Prerequisites, Chemistry 2. 3 class hours, 1 3-hour laboratory period. Credit, 4. Organic chemistry staff.

51. (I) 52. (II) Organic Chemistry

A survey of the properties, preparation and reactions of the important classes of aliphatic and aromatic compounds. Prerequisite: For 1961-62 Chemistry 26, 27 or 29; thereafter Chemistry 4. 3 class hours, 1 or 2 3-hour laboratory periods. The 2 3-hour laboratory periods reserved for and required of chemistry majors. Credit, 4 or 5. Mr. McWhorter.

65. (I) 66. (II) Physical Chemistry

A study of the fundamental theories and laws of physical chemistry. Prerequisites, Chemistry 32 or 27; Mathematics 30; Physics 4. 3 class hours. Credit, 3. Mr. Smith, Mr. Stein, Mr. Stidham, Mr. Stengle.

67. (I) 68. (II) Physical Chemistry Laboratory

Experience in modern physico-chemical techniques. Prerequisites, Chemistry 32; Mathematics 30; Physics 4; or permission of instructor. Concurrent enrollment in Chemistry 65, 66. 1 3-hour laboratory period. Credit, 1. Mr. Stengle, Mr. Stidham, Mr. Rowell.

77. (I) Advanced Physical Chemistry

Topics such as chemical thermodynamics, statistical mechanics, introductory quantum chemistry and theories of gases, liquids and solids. Prerequisites, Chemistry 65 and 66. 3 class hours. Credit, 3. Mr. Stein, Mr. Stidham, Mr. Stengle.

79. (I) Elementary Biochemistry

The more important facts relating to biological materials and processes. Designed primarily for students not eligible for courses 93 or 94. Not open to chemistry majors. Prerequisite, Chemistry 33 or 51. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Robinson.

80. (II) Clinical Chemistry (Blood and Urine Analysis)

Collection and preparation of samples for analysis; standardization of glassware and the preparation of reagents; description of colorimeters and the determination of certain significant compounds. 1 class hour, 1 3-hour laboratory period. Credit, 2. Mr. Robinson.

81. (I) Organic Chemistry

An intensive survey of aliphatic and aromatic chemistry with emphasis on scope and limitations of reactions, mechanisms, and recent developments. Admission by permission of instructor. Prerequisite, one year of Organic Chemistry. 3 class hours. Credit, 3. Organic chemistry staff.

82. (II) Qualitative Organic Chemistry

Identification of unknowns, both single and mixtures of organic compounds, by physical properties, reactions and preparation of derivatives. Admission by permission of instructor. Prerequisite, one year of Organic Chemistry. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Cannon.

83. (I) Advanced Analytical Chemistry

The theory and techniques of colorimetry, potentiometry, microscopy, ion exchange, electro-deposition and other recently developed methods of analysis. Prerequisites, Chemistry 32, 66. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Roberts.

84. (II) Radiochemistry

The character of atomic nuclei, nuclear reactions, radiation and its detection, and techniques for the study and utilization of radionuclides. Prerequisite, Chemistry 27 or 32 or permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Richason.

85. (II) Theory of Analytical Processes

A detailed consideration of analytical topics, as chemical equilibrium, precipitate formation, chelating agents, multistage separation, etc., having general applicability in chemical investigations. Prerequisites, Chemistry 52 and 66. 3 class hours. Credit, 3. (Laboratory optional, 1 extra credit.) Analytical staff.

86. (II) Theoretical Inorganic Chemistry

A theoretical survey of inorganic chemistry based on periodic relationships. Topics include: atomic structure, nuclear chemistry, valence concepts, coordination compounds, and acid-base theory. Prerequisite, Chemistry 65. 3 class hours. Credit, 3. Mr. Smith.

87. (I) Inorganic Chemistry of the Common Elements

A systematic consideration of the chemistry of the common elements and their compounds, based on periodic relationships and modern concepts of structure and bonding. Prerequisite, Chemistry 86 or permission of the instructor. 3 class hours. Credit, 3. Inorganic chemistry staff.

88. (II) History of Chemistry

An historical and biographical survey of chemistry and chemists through a study of the development of new ideas and the establishment of new theories and laws. 2 class hours. Credit, 2. Mr. Robinson.

91. (I) Chemical Literature

Intended to give facility in the location of information of a chemical nature. Prerequisites, Chemistry 52, 66, and a reading knowledge of German or permission of instructor. 1 class hour. Credit, 1. Mr. Oberlander.

93. (I) 94. (II) General Biochemistry

A broad introduction to the general field of biochemistry for students majoring in chemistry or in the biological sciences, and a background for more advanced or specialized study in this field. Prerequisites, Chemistry 51 and 52 or their equivalent. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Little.

98. (II) Introduction to Research

Admission only by permission of the department. To each student is assigned some special subject or problem in one of the several fields of chemistry. Hours by arrangement. 10 laboratory hours. Credit, 5. Staff.

THE CLASSICS

Instructors in Romance Languages

GREEK

1. (I) 2. (II) Elementary Greek (1963-64)

For students with no previous creditable study of Greek. Elements of the language and readings in prose and poetry. Given in alternate years. 3 class hours. Credit, 3. Mr. Greenfield.

5. (I) 6. (II) Intermediate Greek (1962-63)

For students with one year of college Greek or its equivalent. Intensive grammar review. Readings in Homer, Plato, and others. Given in alternate years. Prerequisites, Greek 1, 2, or equivalent. 3 class hours. Credit, 3. Mr. Greenfield.

LATIN

1. (I) 2. (II) Elementary Latin

For students with no previous creditable study of Latin. Elements of the language and introductory reading. 3 class hours. Credit, 3. Mr. Franchini.

5. (I) 6. (II) Intermediate Latin

For students with one year of college Latin or its equivalent. Intensive grammar review. Introduction to Latin Literature: Cicero, Virgil, Ovid, Horace, Livy and others. Prerequisites, Latin 1, 2, or equivalent. 3 class hours. Credit, 3. Mr. Franchini.

DAIRY AND ANIMAL SCIENCE

Head of Department: Professor D. J. Hankinson; Professors W. Black, Foley, Gaunt; Associate Professor Potter; Assistant Professors D. Black, Bruce, Buck, Evans, McFadden.

ANIMAL SCIENCE

2. (II) Introduction to Animal Science

Tools, trends, problems and opportunities in animal science. The impact of recent developments in genetics, nutrition, physiology and management on the livestock industry is illustrated. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Bruce.

33. (II) Elements of Meat Packing

The packing industry, classes and grades of livestock and meat, meat inspection, grading, slaughtering procedures and preparation of wholesale cuts. Field trips cost approximately $5.00. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Buck.

51. (I) Fundamentals of Animal Nutrition

Principles of nutrition, including study of the nature and function of nutrients, and requirements for maintenance and production in ruminants and swine. 3 class hours. Credit, 3. Mr. MacFadden.

52. (II) Feeds and Feeding

The principles of nutrition applied to practical livestock feeding. Methods of feed evaluation, feeding standards, formulation of rations, and composition and nutritive value of feeds. Prerequisite, Animal Science 51. 2 2-hour laboratory periods. Credit 2. Mr. MacFadden.

54. (II) Meat Processing

The preparation of retail cuts of meat and manufactured meat products; their preservation and care. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Buck.

56. (II) Livestock Production

Beef, sheep and swine production in the U. S. and New England. Enterprise types, feeding systems, selection procedures, management and marketing. Field trips cost approximately $5.00. 3 class hours, 1 2-hour laboratory period. Credit, 4. Mr. Bruce.

65. (I) Physiology of Reproduction

Comparative aspects of anatomy, embryology, endocrinology and physiology of the reproductive system, particularly in farm mammals. Concepts of fertility and sterility, and their evaluation. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. W. Black.

66. (II) Applied Animal Genetics

The mechanisms of heredity and variation in farm mammals; the role of selection procedures and breeding systems in genetic improvement of livestock and their evaluation. Prerequisite, Zoology 53. 3 class hours. Credit, 3. Mr. Gaunt.

75. (I) Milk Secretion

Lactation in all its aspects, including anatomy of the mammary gland, development of the bovine udder, endocrine control of secretion, and applications in herd management. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Foley.

78. (II) Dairy Cattle Management

Dairy cattle and milk production in the U. S. and New England, including study of managerial problems concerned in successful dairying. Field trips cost approximately $20.00. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Foley.

79. (I) Light Horse Management

Breeds and adaptations; fundamentals of selection, feeding, training and management; tack and its care, brief introduction to equitation. Field trips cost approximately $5.00. Open to all University students. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Bruce.

96. (II) Seminar

For Animal Science majors. 1 2-hour laboratory period. Credit, 1. Staff.

97. (I) 98. (II) Special Problems in Animal Science

Problem work under staff supervision, intended to introduce qualified Seniors to research methods in some phase of animal science, e.g., nutrition, genetics, reproduction, meats, lactation. Credit, 1-3. Staff.

DAIRY TECHNOLOGY

25. (I) General Dairying

Introductory course in dairy technology presenting the general processing, distribution, and selection of milk and milk products. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Hankinson.

52. (II) Market Milk

The various phases of the fluid milk industry from procurement through processing and distribution. 2 class hours, 1 4-hour laboratory period. Credit, 4. Mr. Evans.

75. (I) Dairy Chemistry

The physical and chemical principles which aid in explaining the behavior of milk and milk products in the various technological operations. Application of quantitative and qualitative analyses to dairy products. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Potter.

77. (I) Butter and Cheese Making

A study emphasizing production and storage of the dairy by-products, butter, cheese, concentrated and dried milks. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Evans, Mr. Potter.

78. (II) Ice Cream Making

The theory and practices involved in the production and distribution of ice cream and related products. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Potter.

95. (I) 96. (II) Seminar

For Dairy Technology majors. 1 class hour. Credit, 1. Staff.

97. (I) 98. (II) Special Problem in Dairy Technology

Problem work under staff supervision, intended to introduce qualified Seniors to research methods in some phase of dairy technology. Credit, 1-3. Staff.

ECONOMICS

Head of Department: Professor Philip L. Gamble. Professors Morris,* Schoeffler, Howard; Associate Professor Blackman; Assistant Professors Martin and Meier; Messrs. Chaudhry, Miller, F. Smith, R. Smith.

12. (II) Economic History of the United States

Important aspects of the evolution of our modern economic system; social, technological, and other changes which have affected economic institutions; public policy problems involved. 3 class hours. Credit, 3. Mr. F. Smith.

25. (I) and (II) Elements of Economics

Definitions, principles of production, exchange, the distributing methods of allocation of income and revenue. 3 class hours. Credit, 3. Mr. Gamble, and Staff.

26. (II) Problems of the National Economy

A continuation of Course 25. Current problems, including international economic planning in peace and war. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Martin and Staff.

53. (I) Money, Banking and Credit

The development and operation of the monetary and banking systems of the United States; problems of achieving full employment and price stability through monetary controls. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Gamble.

54. (II) Money, Income and Monetary Policy

The relationship between money, income and monetary policy. An examination of the relationships between individuals, banks, money markets, governments and central banks. Prerequisites, Economics 25 and either Economics 53 or Finance 55. 3 class hours. Credit, 3. Mr. Gamble.

55. (I) Economics of Consumption and Personal Finance

Patterns of consumption, standards of living and the sources and expenditure of individual and family incomes. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Miller.

56. (II) Business Fluctuations and Forecasting

Nature and causes of business fluctuations; methods of forecasting; government policy for stability; utility of available statistical data as guides to private and public policy. Prerequisites, Economics 25, 53 or Finance 55. 3 class hours. Credit, 3. Messrs. Howard and Miller.

70. (II) The Structure of American Industry

Business enterprise, market competition, and economic development in American industries. The social effectiveness of industries analyzed through measures of industrial structure and market performance. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Howard.

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* On leave of absence.

73. (I) Modern Economic Theory and Analysis

Micro-economic analysis: types of markets: applications of linear programming, theory of games and other techniques for rational business planning: balancing forces in free-enterprise economy. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Schoeffler.

75. Mathematical Methods in Economics

The applications of various mathematical concepts and techniques in macro-economic and micro-economic analysis. Special emphasis is placed on the design and interpretation of mathematical models of economic phenomena. Prerequisites, Economics 25, 26; Mathematics 1, 2 or 4, or consent of the instructor. 3 class hours. Credit, 3. Mr. Chaundry.

77. (I) Economics of International Trade (1962-63)

Policies, principles, and practices of international trade. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Meier.

78. (II) Public Finance

Principles of public revenues and expenditures; systems and problems of taxation; use of taxes, expenditures, debt policy to provide full employment, economic growth and price stability. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Gamble.

79. (I) Labor Problems

Background of the labor movement and problems involved in the management-labor relationship and the efforts of management, unions and government to solve them. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Blackman.

80. (II) Labor Law and Legislation

Economics effects and historical survey of Federal and state laws and an analysis of important court decisions. Prerequisites, Economics 25, 79. 3 class hours. Credit, 3. Mr. Blackman.

81. European Economic Evolution

Evolution of economic organization in agriculture, industry and commerce; the surrounding social and institutional life. Prerequisites, Economics 25, History 5 and 6, or consent of the instructor. 3 class hours. Credit, 3. Mr. Meier.

82. (II) Economic Development

Economic problems of underdeveloped countries and the policies necessary to induce growth. Individual projects will be required. Prerequisites, Economics 25, 26. 3 class hours. Credit, 3. Mr. Meier.

83. (I) Social Control of Business

The formal and informal methods and efforts to maintain, supplement and moderate competition, and the substitution of regulation or public enterprises for competition. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Howard.

84. (I) Comparative Economic Systems

The structure, operation, and underlying idealogy of the major contemporary forms of social-economic organization. Emphasis on the Soviet Union and the United States. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Schoeffler.

86. (II) Doctrinal Backgrounds of Contemporary Theory

Foundations of classical theory from physiocracy through Mill; neoclassicism and its chief variants, the Lausanne, Austrian and English schools; dissenters Marx, German historical school, Veblen. Prerequisite, Economics 25. 3 class hours. Credit, 3. Mr. Miller.

88. Financial Aspects of Economics

The application of modern flow-of-funds analysis to the financial behaviour of the various sectors of the economy. Special emphasis is placed on the financial aspects of business units and the business sector. Prerequisites, Economics 25 and Accounting 25, or consent of the instructor. 3 class hours. Credit, 3. Mr. Martin.

95. (I) 96. (II) Seminar

Research in economic theory; problems of labor, commerce, and industry. If desirable, some other economic study may be substituted. Prerequisites, Economics 25 and 26. 1 or 2 2-hour conferences. Credit, 1 to 3.

EDUCATION

Dean: Professor Albert W. Purvis. Professors Anthony, Oliver, Wyman; Associate Professors O'Leary, Pippert, Rogers; Assistant Professors Archer, Barfield, Byrne, Cohen, Eddy, Freisem, Hall, Jones, Kornegay, McManamy, Thelen; Bertrand, Sleeman.

9. (I) (II) Directed Observation

Fifteen hours in the Laboratory School in the freshman year. Prerequisite to the Elementary Education Block. Credit, 0.

39. (I) (II) Directed Observation

Twenty hours in the Laboratory School in the sophomore year. Prerequisite to the Elementary Education Block. Credit, 0.

51. (I) (II) History of Education

Educational movements are traced from early Greece to the present with the aim of better understanding of modern problems. 3 class hours. Credit, 3. Mr. Eddy, Mr. Cohen.

52. (I) (II) Principles and Methods of Teaching

By means of discussion, case studies, and current educational literature, teaching ideals and procedures are set up and applied to the major teaching fields. 3 class hours. Credit, 3. Mr. Anthony, Mr. Thelen.

53. (I) (II) Educational Tests and Measurements

The most serviceable tests for measuring achievement are considered; test construction, administration, scoring, and interpretation of results are studied and applied to the classroom. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Archer.

59. (I) (II) Directed Observation

Twenty hours in the Laboratory School in the junior year. Prerequisite to the Elementary Education Block. Credit, 0.

60. (I) (II) Elementary School Curriculum

The elementary school curriculum from the standpoint of content and methodology. Emphasis placed on the unit method and the activity programs. 3 class hours. Credit, 3. Mr. Rogers.

61. (I) (II) Teaching of Elementary Reading and Language Arts

Discussions and demonstrations of principles and effective practices in the teaching of all phases of the language arts. 3 class hours. Credit, 3. Miss O'Leary, Mr. Byrne.

62. (I) (II) Teaching of Elementary Arithmetic

Accepted methods and materials in the teaching of arithmetic in the elementary grades will be studied and demonstrated. 3 class hours. Credit, 3. Mr. Hall.

64. (I) (II) Principles of Elementary Education

The aim, organization, program, pupil population, of the elementary school and the relationship between elementary and secondary school are the areas of concentration. 3 class hours. Credit, 3. Miss McManamy.

66. (I) (II) Preparation and Use of Audio-Visual Materials

Study is made of available machines, materials and techniques for teaching groups of students. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wyman, Mr. Sleeman.

72. (I) Vocational Education in Agriculture

A survey of vocational agricultural education and an introduction to teaching of vocational agriculture at the secondary level. Admission by permission of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Jones.

73. (I) (II) Apprentice Teaching in Agriculture

A full year in absentia normally following the junior year, teaching agriculture, horticulture, and related subjects under a supervising teaching in selected schools. Prerequisites, Education 72 and 75. Credit, 6. Mr. Jones.

75. (II) Technique of Teaching Vocational Agriculture

The materials, methods, policies, and special requirements of Massachusetts for teaching vocational agriculture and related subjects in high schools and in special county agricultural schools. Prerequisite, Education 72 or permission of the instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Jones.

77. (I) (II) Principles of School Guidance

The need for guidance in the schools, the nature of guidance, and an overview of an adequate guidance service for a school system. 3 class hours. Credit, 3. Mr. Pippert.

85. (I) (II) Observation and Student Teaching

In cooperating schools within commuting distance of the University, under staff supervision. Given only in the elementary and secondary concentrated blocks. Prerequisites for secondary block; Education 51 and Psychology 56; for elementary block: Education 9, 39, 51, 59, 64; Psychology 65 or Home Economics 70. Credit, 6. Mr. Freisen, and the Staff.

88. (I) (II) Secondary School Curriculum

Learning materials and activities and their organization in various teaching fields. 2 class hours, 1 2-hour laboratory work. Credit, 3. Mr. Kornegay, Mr. Barfield.

ENGINEERING

CHEMICAL ENGINEERING

Head of Department: Professor E. E. Lindsey. Associate Professor Cashin; Assistant Professors Duus, Kim; Visiting Lecturer Chappalaer.

25. (I) 26. (II) Fundamentals

An introduction to the nature and scope of chemical engineering through the study of selected chemical processes and of material and energy balances. Prerequisites, Chemistry 2 or 4; Physics 4 or 6 for Course 26. 3 class hours. Credit, 3.

55. (I) Unit Operations I

The unit operations of fluid flow, heat transfer and evaporation. The thermodynamic properties of matter. Prerequisites, Chemical Engineering 26; Mathematics 30 or 31. 4 class hours. Credit, 4.

56. (II) Unit Operations II

A continuation of Course 55; including the additional unit operations of distillation, gas absorption, liquid extraction, crystallization, filtration, mixing, crushing and grinding. Prerequisite, Chemical Engineering 55. 4 class hours. Credit, 4.

58. (II) Organic Chemical Technology

Some of the unit processes involved in the manufacture of organic chemicals. Includes nitration, amination, halogenation, oxidation and esterification. Prerequisite, Chemistry 51. 2 class hours, 1 3-hour Lab. Credit, 3.

61. (II) Chemical Engineering Analysis

A study of mathematical techniques with application to chemical engineering problems. Emphasis is on setting up ordinary differential equations corresponding to specific problems and in methods for their solution. The last few hours of the course deal with machine computation. Prerequisites, Chemical Engineering 56 and Math. 32. 3 class hours. Credit, 3.

75. (Summer) Instrumentation

A detailed study of the underlying principles and practices in indicating, recording and controlling instruments used on industrial process equipment. Prerequisite, Physics 4 or 6. 3 40-hour weeks. Credit, 3.

76. (II) Automatic Process Control

A study of the theoretical and practical factors governing automatic control of industrial processes. Topics include: control systems, review of measurement devices, control modes, mathematical relationships and analysis of control systems. Prerequisites, Chemical Engineering 56 and 81; Math. 32. 2 class hours, 1 3-hour laboratory. Credit, 3.

77. (I) Elements of Unit Operations

For other than chemical engineering majors. Some of the unit operations of process industries. Emphasis on the principles and types of equipment, rather than on the quantitative aspects and design. Prerequisites, Chemistry 30; Physics 3, 4 or 6. 3 class hours. Credit, 3.

78. (I) Advanced Unit Operations

A more detailed study of certain unit operations. Prerequisite, Chemical Engineering 56. 2 class hours. Credit, 2.

80. (II) Kinetics

Principles underlying the rates at which chemical transformations take place. Review of differential equations governing reaction velocity; effect of temperature and catalysis; application to design of industrial chemical reactors. Prerequisite, Chem. 65. 2 class hours. Credit, 2.

81. (I) Heat-energy Relations

Types of energy, energy balances, second law, thermodynamic functions, P-V-T relations of fluids, compression and expansion processes. Prerequisites, Chemistry 66; Chemical Engineering 56. 3 class hours. Credit, 3.

82. (II) Industrial Equilibria

Phase and chemical equilibria and rates of reaction in chemical processes from the industrial point of view. Prerequisites, Chemistry 66; Chemical Engineering 81. 3 class hours. Credit, 3.

83. (I) Survey of Nuclear Engineering (I)

An introduction to the principles of reactor physics and a survey of problems involved in the design and operation of nuclear reactors. Also problems in heat transfer, shielding, instrumentation and waste disposal. Prerequisites, Chemistry 1, 2; Physics 3, 4 or 5, 6; Mathematics 29, 30, or equivalent; and permission of the instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3.

84. (II) Survey of Nuclear Engineering (II)

A continuation of Chemical Engineering 83 with emphasis on reactor physics. Prerequisite, Chemical Engineering 83. 2 class hours, 3 laboratory hours. Credit, 3.

87. (I) Process Equipment Design

The design of process equipment for the chemical industries; riveted pressure vessels, welded pressure vessels, piping, attachments and closures, etc. Prerequisites, Chemical Engineering 55; Civil Engineering 53. 1 class hour, 1 3-hour laboratory period. Credit, 2.

88. Chemical Engineering Laboratory

Study of pilot plant size equipment illustrating some unit operations. Emphasis on the securing of accurate data, correct operating techniques, and on report writing. Prerequisite, Chemical Engineering 56. 2 3-hour laboratory periods. Credit, 2.

93. (I) 94. (II) Comprehensive Problems

The solution of comprehensive problems which requires the application and integration of a number of the principles studied in previous courses in chemistry and chemical engineering. Prerequisites, Chemical Engineering 56; Chemistry 66. 2 class hours, 1 3-hour computation period. Credit, 3.

95. (I) 96. (II) Seminar

Preparation and discussion of professional topics of interest to chemical engineers. 1 class hour. Credit, 1.

97. (I) Laboratory Projects

Investigation and report on an elementary chemical engineering problem. Prerequisites, Chemical Engineering 56, 88. 1 3-hour laboratory period. Credit, 1.

98. (II) Laboratory Projects

Investigation and report on an elementary chemical engineering problem. Prerequisites, Chemical Engineering 56, 88. 2 3-hour laboratory periods. Credit, 2.

CIVIL ENGINEERING

Head of Department: Professor Merit P. White. Professors Feng, Hendrickson, Marcus, Marston, Osgood; Associate Professors Boyer, Carver, Grow, Higgins; Assistant Professors Dzialo, Harris, Peck; Mr. Bemben.

27. (I) Plane Surveying

Elements of plane surveying: taping, transit, level, stadia, topographic surveying and mapping, care and adjustment of instruments. Prerequisite, Trigonometry. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

28. (Summer) Surveying Practice I

Property surveys, topographic surveys by stadia and plane table, triangulation. Prerequisite, Civil Engineering 27 or 31. 3 40-hour weeks. Credit, 3. Mr. Boyer.

30. (Summer) Surveying Practice II

Preliminary route survey with plan, profile, cross sections, slope stakes, earthwork quantities. Prerequisite, Civil Engineering 32. 3 40-hour weeks. Credit, 3. Mr. Boyer.

31. (I) Surveying I

Theory of surveying. Use, care, and adjustment of tape, transit, and level; traverse computation; topographic surveying and mapping; property surveying. Prerequisite, Trigonometry. 1 class hour, 2 3-hour laboratory periods. Credit, 3. Mr. Boyer.

32. (II) Surveying II

Route surveys; centerline layout; simple, compound, reverse, parabolic, and spiral curves; construction surveys; earthwork computation; chainage equations; astronomical observations. Prerequisite, Civil Engineering 31. 2 class hours. 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

34. (I) and (II) Statics

Topics considered: resultants of force systems, equilibrium of forces using algebraic and graphical methods; friction, first and second moments, center of gravity. Prerequisite, Integral Calculus or concurrently. 3 class hours. Credit, 3.

52. (I) and (II) Dynamics

Motions of particles and rigid bodies and the force systems causing these motions. Prerequisite, Civil Engineering 34. 3 class hours. Credit, 3.

53. (I) and (II) Strength of Materials I

Simple and combined stresses and strains in tension, compression and shear; torsion; stresses and deflections in beams. Prerequisite, Civil Engineering 34. 3 class hours. Credit 3.

55. (I) Transportation Engineering I

Major transportation systems with emphasis on geometric design of highways, transportation and traffic studies, and design and operation of railroads. Prerequisite, Civil Engineering 32. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

62. (II) Engineering Materials

A study of engineering materials with particular emphasis on mechanical properties. The correlation between experimental observations and theory. Prerequisite, Civil Engineering 53. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Peck.

63. (I) Testing Materials

Laboratory methods for the determination of the physical properties of engineering materials. For mechanical engineering students. Prerequistes, Mechanical Engineering 35 or 31; Civil Engineering 53 concurrently. 1 3-hour laboratory period. Credit, 1. Mr. Peck.

70. (II) Theory of Structures I

An elementary treatment of statically determinate structures, especially buildings and bridges. Prerequisite, Civil Engineering 53. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

71. (I) Structural Design

The choosing and proportioning of the elements and connections of metal structural frames of buildings and bridges. Designs are made. Prerequisite, Civil Engineering 70. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

72. (I) Theory of Structures II

The analysis of statically indeterminate structures by several appropriate methods. Prerequisite, Civil Engineering 70. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

73. (II) Reinforced Concrete

The analysis and design of reinforced concrete structures. Prerequisite, Civil Engineering 53. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Osgood.

74. (II) Theory of Structures III

The analysis and design of complex or special structures in metal, concrete or wood. Prerequisites, Civil Engineering 71, 72; 73 concurrently. 3 class hours. Credit, 3. Mr. Osgood.

75. (I) and (II) Fluid Mechanics

A study of the properties and behavior of fluids, involving laws of hydrostatics, kinetics and dynamics. Flow measurement, hydraulic machinery, flow in pipes and open channels. Prerequisite, Civil Engineering 52. 3 class hours. Credit, 3. Mr. Carver, Mr. Higgins.

76. (I) and (II) Fluid Mechanics Laboratory

Applications of fluid mechanics theory. Flow measurement and behavior of fluids in pipes and open channels. Prerequisite, Civil Engineering 75 concurrently. 1 3-hour laboratory period. Credit, 1. Mr. Carver, Mr. Higgins.

77. (II) Sanitary Engineering I

Water demand and quantity of sewage, water collection and distribution, sewer systems, and pumping stations. Prerequisite, Civil Engineering 75, concurrently. 3 class hours. Credit, 3. Mr. Feng.

78. (I) Sanitary Engineering II

Water and sewage laboratory analysis, stream pollution, water and sewage treatment, industrial waste problems. Prerequisite, Civil Engineering 75. concurrently. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

79. (I) Principles of Sanitary Engineering

Designed for students in the Department of Public Health, covering phases of Civil Engineering 77 and 78 with consideration of the non-engineering background of the student. Admission by permission of the instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

80. (II) Soil Mechanics I

Classification of soil for engineering purposes. Analysis of earth masses for seepage, stress and strain. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Hendrickson.

81. (I) Soil Mechanics II

Foundations and earth structures. Interpretation of borings. Analysis and design of piles, footings, piers, abutments, and retaining walls. Prerequisite, Civil Engineering 80. 3 class hours. Credit, 3. Mr. Hendrickson.

82. (I) Soil Testing

Soil testing and sampling. Techniques of measuring permeability, consolidation, and shear. 1 class hour, 2 3-hour laboratory periods. Credit, 3. Mr. Hendrickson.

85. (I) Water and Wastewater Analysis

Analysis of water relative to its quality for various domestic and industrial uses and analysis of wastewater relative to its potentiality of pollution. Prerequisites, Chemistry 1, 2. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

86. (II) Sanitary Engineering III

The hydraulics and chemistry relating to water and sewage treatment, lay-out and design of water and sewage treatment plants. Prerequisites, Civil Engineering 77 and 78. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Feng.

87. (I) Open Channel Flow

A study of steady flow in open channels including backwater curves in natural and artificial channels, hydraulic jump, channel bends and transitions, sediment transport, surges and waves, breakwaters and hydraulic structures. Prerequisite, Civil Engineering 75. 3 class hours. Credit, 3. Mr. Higgins.

88. (II) Strength of Materials II

Investigation of stresses and strains in elements of machines and structures caused by static or dynamic loads. Prerequisite, Civil Engineering 53 with grade of A or B. 3 class hours. Credit, 3. Mr. White.

90. (II) Contracts and Specifications

Current practice and the legal aspects of preparing construction contracts; specifications and cost estimates. 3 class hours. Credit, 3. Mr. Grow.

91. (I) Surveying III

Elements of astronomical geodetic and photogrammetric surveying; coordinate systems and map projections. Prerequisite, Civil Engineering 32. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

92. (I) Hydraulic Engineering

Analysis and design of hydraulic structures. Hydrology, water power estimates and economics, dams and appurtenances, reservoirs, turbines and pumps; a design of a typical hydroelectric development. Prerequisite, Civil Engineering 75. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Higgins.

93. (II) Introduction to Hydrodynamics

A mathematical treatment of the basic theorems of classical hydrodynamics including potential flow, conformal mapping, wave and vortex motion, Navier-Stokes equation and boundary layer theory. Prerequisite, Mathematics 32. 3 class hours. Credit, 3. Mr. Carver.

94. (II) Transportation Engineering II

The engineering aspects of traffic problems, geometric design of urban and rural highways including intersections, traffic signs and signals, and planning studies. Prerequisite, Civil Engineering 55. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Boyer.

96. (II) Professional Seminar

For senior civil engineering students. Current engineering projects and the professional aspect of the civil engineer's work are described by student reports. 1 class hour. Credit, 1.

97. (I) 98. (II) Civil Engineering Project

Investigation of a problem or completion of a project significant in civil engineering. Prerequisite, Average of 3.0 for preceding two semesters, and permission of department. Credit, 3.

ELECTRICAL ENGINEERING

Head of Department: Professor G. Dale Sheckels, Professors Langford, Roys; Associate Professors Bett, Edwards, Fitzgerald, Laestadius, Mohn; Assistant Professors Herchenreder, Scott; Visiting Professors Longley, Maunder.

41. (I) 42. (II) Linear Circuit Analysis I and II

Analysis using differential relationships, free and forced responses, complex frequency, steps and impulses, poles and zeros and network theorems. Prerequisites, Mathematics 6 and Physics 6. 3 class hours, 1 3-hour computation and laboratory period. Credit, 4.

51. (I) Linear Circuit Analysis III

Polyphase circuits, coupled circuits, harmonics, Fourier series, and magnetic circuit. Prerequisites, Mathematics 32 and E. E. 42. 3 class hours, 1 3-hour laboratory period, Credit, 4.

52. (II) Linear Circuit Analysis IV

The use of operational and transform methods for the solution of fundamental equations of electrical, mechanical and thermal systems, with a correlated study of functions of a complex variable. Prerequisite, E. E. 5. 3 class hours. Credit, 3.

53. (I) 54. (II) Energy Conversion Systems I and II

Principles of operation and physical aspects of energy conversion systems with a detailed analysis of performance and control of transformers and rotating electrical machinery. Prerequisite, E. E. 42. 3 class hours, 1 3-hour laboratory period. Credit, 4.

55. (I) 56. (II) Electronics I and II

Physical phenomena of electronic conduction in solids, vacua, and gases. Applications include amplifiers, rectifiers, oscillators, inverse feedback systems, computers, and other basic circuits. Prerequisite, E. E. 42, or consent of instructor. 3 class hours, 1 3-hour laboratory period. Credit, 4.

57. (I) Electromagnetic Fields

Static and time varying electromagnetic fields using vector notation, Maxwell's equations, relations between field and circuit theory. Plane waves in dielectric and conducting media. Prerequisites, E. E. 42 with Mathematics 32 concurrently. 3 class hours. Credit, 3.

61. (I) Fundamentals of Electrical Engineering

A study of basic laws of electrical science as they pertain to electric and magnetic circuits. Not open to electrical engineers. Prerequisites, Physics 6, Mathematics 31 or equal. 3 class hours, 1 3-hour laboratory period. Credit, 4.

62. (II) Basic Application of Electrical Engineering

A study of the general applications of the basic laws of electrical engineering in the fields of stationary and rotating electromechanical machinery and basic electronics. Not open to electrical engineers. Prerequisites, E. E. 61. 3 class hours, 1 3-hour laboratory period. Credit, 4.

65. (I) 66. (II) Electronics I and II

These courses are identical to the lecture portions of EE 55 and 56. They are not open to electrical engineers. Prerequisites, Physics 26 and Mathematics 31, or equivalents. 3 class hours. Credit, 3.

77. (I) Principles of Switching Circuits

Logical design of switching circuits with emphasis on the scientific methods available; the analysis and synthesis of switching systems using electromagnetic, electronic and solid state devices. Prerequisites, EE 56 and 51. 3 class hours, 1 3-hour laboratory period. Credit, 4.

78. (II) Principles of Switching Circuits II

Multiterminal and iterative circuits; circuit reliability; switching codes; alternative methods of sequential circuit design with emphasis on synchronous pulse circuits; trends in switching. Prerequisite, EE 77. 3 class hours. 1 3-hour laboratory period. Credit, 4.

79. (I) Communication Circuits

Theory of lumped circuits and lines including matrices, positive real functions, and synthesis methods of Foster and Cauer. Prerequisite, EE 52. 3 class hours, 1 3-hour laboratory period. Credit, 4.

80. (II) Electronics III

Active circuits and communication theory covering tube and semi-conductor circuitry with emphasis on aspects pertaining to information transmission. Prerequisite, EE 56. 3 class hours, 1 3-hour laboratory period. Credit, 4.

81. (I) Advanced Electrical Machinery

Modern methods of analysis, including two reaction, symmetrical component, matrix, vector-dyadic and tensor formulations. Applications include d-c and a-c motors and generators and amplidynes. Prerequisites, EE 54, 52 concurrently. 3 class hours, 1 3-hour laboratory period. Credit, 4.

84. (II) Industrial Electronics and Control

Industrial electronic devices and their characteristics; basic circuits and their application to commercial equipment. Prerequisites, EE 55, or 62. 3 class hours, 1 3-hour laboratory period. Credit, 4.

85. (Summer) Electrical Measurements

Theory and practice of electric and magnetic measurements, accuracy, precision, maximum possible and probable errors, and limitations of measurements and devices. Prerequisite, EE 42. 3 40-hour weeks. Credit, 3.

86. (II) Power System Networks

Power transfer diagrams, voltage studies, system stability criteria, short-circuit calculations, and protective methods. Prerequisite, EE 52. 3 class hours, 1 3-hour laboratory period. Credit, 4.

88. (II) Pulse Circuits

Generation, transmission and processing of information by means of pulses, with applications to computers, communications, radar and television. Prerequisite, EE 52. 3 class hours, 1 3-hour laboratory period. Credit, 4.

90. (II) Feedback Control Systems I

Analysis and design of error-sensitive control systems. Analytical and graphical determination of steady state and transient performance; applications to electrical, mechanical, and hydraulic systems. Prerequisite, E. E. 52. 3 class hours. 1 3-hour laboratory period. Credit, 4.

92. (II) Principles of Electrical Design

The fundamentals of electric, dielectric, magnetic and heat-flow systems applied to the design, performance, rating and life of coils, transformers, machinery and other equipment. Prerequisite, E. E. 54. 2 class hours, 1 3-hour laboratory period. Credit, 3.

94. (II) Microwave Engineering

Fundamental principles of communications and electromagnetism and their application to the special problems of the generation, transmission, propagation and reception of microwaves. Prerequisite, E. E. 79. 3 class hours, 1 3-hour laboratory period. Credit, 4.

96. (II) Professional Seminar

Current engineering developments are discussed through student reports. Instruction is given in the preparation of papers for publication and in their presentation before technical audiences. 1 class hour. Credit, 1.

97. (I) 98. (II) Special Problems

An individual investigation carried out under the supervision of an interested staff member, or a class study of recent advances and current problems in a specialized field of electrical engineering. Prerequisites, Consent of instructor. Credit, 1-4.

MECHANICAL ENGINEERING DEPARTMENT

Head of Department: Professor William H. Weaver. Professors Bates, Dittfach, Keyser, Swenson; Associate Professors Day, O'Byrne, Patterson, Sobala*, Weidmann; Associate Professors Costa, Hopkins, Jucker, Kroner, Rising, Roberts, Trueswell*; Messrs. Bissey, Cromack, Schwind, Stevens.

1. (I) Graphics

The course purpose is to develop a working knowledge of orthographic projection including multi-view drawing, sections, dimensions, pictorial representations and lettering. 2 3-hour laboratory periods. Credit, 2.

2. (II) Descriptive Geometry

The theory of orthographic projection. Geometric concepts of lines, planes, solids; solution of engineering problems involving true sizes, angles and shapes by graphical methods. Prerequisite, Mechanical Engineering 1. 1 class hour, 2 3-hour laboratory periods. Credit, 3.

23. (Summer) Shop

The course is divided equally between machine shop and welding to develop an understanding of metal working processes. Not for Mechanical or Industrial engineers. Prerequisite, Mechanical Engineering I. 3 40-hour weeks. Credit, 3.

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* On Leave of Absence.

27. (Summer) Shop

The course provides an understanding of the weldability of metals through manual and automatic welding processes. Prerequisite, Mechanical Engineering I. 3 40-hour weeks. Credit, 3.

28. (Summer) Machine Shop

The course provides an understanding of the machining of metals through the use of standard machine tools. Prerequisite, Mechanical Engineering I. 3 40-hour weeks. Credit, 3.

29. (Summer) Machine Shop and Welding

Manual and automatic welding processes. Theory of welding, machine tool operation, fits, tolerances and measurements. Prerequisite, Mechanical Engineering I. 5 25-hour weeks. Credit, 4.

35. (I) Engineering Materials and Processes

The methods of producing and fabricating engineering materials. A study of the properties affecting application. Laboratory testing of materials. Prerequisite, Chemistry 2 or 4; Physics 6 taken previously or concurrently. 3 class hours, 1 3-hour laboratory period. Credit, 4.

46. (II) Fundamentals of Metallurgy

Physical metallurgy involving crystal structure, solid solutions, diffusion in the solid state, freezing of metals, metal hardening, annealing, equilibrium diagrams. Heat treating processes. Prerequisite, Mechanical Engineering 35 or Chemistry 66. 2 class hours, 1 3-hour laboratory period. Credit, 3.

63. (I) Engineering Thermodynamics I

The application of the laws of heat to various energy-transforming devices, including ideal and actual cycles of steam, internal combustion engines and air compressors. Prerequisites, Physics 5 and 6; Mathemaitcs 30 or 31. 3 class hours. Credit, 3.

64. (II) Engineering Thermodynamics II

A study of liquids and vapors, thermodynamic cycles, energy transformations, the transfer of heat plus appropriate problems. Prerequisite, Mechanical Engineering 63. 3 class hours. Credit, 3.

67. (II) Mechanical Instrumentation Laboratory

The calibration and application of instruments used in the testing of mechanical engineering apparatus. Prerequisite, Mechanical Engineering 63. 1 3-hour laboratory period. Credit, 1.

68. (II) Kinematics

Principles of mechanism, including velocity and acceleration diagrams, instant centers, gear teeth and gear trains, cams, and various speed transmissions. Prerequisites, Mechanical Engineering 1; Civil Engineering 52. 2 class hours, 1 3-hour laboratory period. Credit, 3.

74. (I) and (II) Basic Aerodynamics

The basic concepts of applied aerodynamics, including properties of air, ideal fluid flow, airfoils and their properties, aircraft performance and stability. Prerequisite, Civil Engineering 76. 3 class hours. Credit, 3.

75. (I) Steam Power Plants

The steam power plant, including boilers, stokers, fuels, combustion, steam generation, prime movers, and auxiliary equipment, and engineering problems involved in design and operation. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

76. (II) Refrigeration and Air Conditioning

Fundamental principles of thermodynamics as applied to refrigeration in industrial processes and the control of temperature, humidity and motion of air in buildings. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

77. (I) Internal Combustion Engines

The thermodynamic and performance aspects of reciprocating gasoline and Diesel engines, steady flow gas turbines, turbo-jet engines and rockets. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

79. (I) Mechanical Engineering Laboratory I

Standard performance tests of steam, gasoline and Diesel engines, fans, turbines, compressors, and refrigeration systems. Emphasis is placed on following the appropriate Power Test Code. Prerequisites, Mechanical Engineering 67 for M. E. majors; Mechanical Engineering 63 for non M. E. majors. 1 3-hour laboratory period. Credit, 1.

80. (II) Mechanical Engineering Laboratory II

Advanced project experimental work in all phases of Heat Power equipment. Prerequisite, Mechanical Engineering 79. 2 3-hour laboratory periods. Credit, 2.

81. (I) Experimental Mechanical Engineering

Performance tests on mechanical engineering equipment. Calibration and application of instruments used in these tests. For industrial engineering majors. Prerequisite, Mechanical Engineering 63. 2 3-hour laboratory periods. Credit, 2.

82. (II) Heat Transfer

A study of the mechanisms of heat transfer: conduction, convection and radiation, with engineering applications. Prerequisites, Mechanical Engineering 63; Mathematics 32 or 92. 3 class hours. Credit, 3.

83. (I) Machine Design

Principles involved in the design of various machine parts. Related topics such as economy of manufacture, safety, styling, invention and creativity. Prerequisites, Civil Engineering 53; Mechanical Engineering 2, 27, 28, 68. 2 class hours, 1 3-hour laboratory period. Credit, 3.

84. (II) Basic Engineering Analysis

The application of mathematical solutions to problems in vibrations, elasticity, fluid mechanics and dynamics. The analysis of the problems and the derivation of the governing equations. Prerequisite, Mathematics 32 or 92. 3 class hours. Credit, 3.

85. (I) Dynamics of Machinery

Elements of vibration theory, vibration isolation, absorbers, instrumentation, analysis of equivalent masses and shaft systems. Dynamic balancing. Prerequisites, Civil Engineering 52; Mechanical Engineering 68. 3 class hours, 1 3-hour laboratory period. Credit, 4.

86. (II) Advanced Machine Design

Continuation of Course 83. Additional elementary parts are analyzed and some complete machines studied. Emphasis on invention and creativity. Prerequisite, Mechanical Engineering 83. 2 class hours, 1 3-hour laboratory period. Credit, 3.

87. (I) Engineering Thermodynamics III

Topics investigated include steam turbines, steam power plants, refrigeration, high-velocity flow, and shock phenomena. Prerequisite, Mechanical Engineering 64. 3 class hours. Credit, 3.

88. (II) Science of Engineering Materials

A physical explanation of the mechanical, electrical, magnetic and thermal properties of engineering materials. Prerequisites, Chemistry 2 or 4, Physics 5 and 6 or 25 and 26, or their equivalents. 3 class hours. Credit, 3.

89. (I) Instrumentation

A study of mechanical instrumentation with mechanical-electrical transducers emphasized. A few heat power experiments included. For electrical engineering majors or permission of instructor. Prerequisite, Mechanical Engineering 64. 1 class hour, 1 3-hour laboratory period. Credit, 2.

90. (II) Advanced Metallurgy

Advanced topics in engineering metallurgy, including X-ray diffraction and X-ray fluorescent analysis. Prerequisite, Mechanical Engineering 46. 2 class hours, 1 3-hour laboratory period. Credit, 3.

93. (I) Nomography

The construction of functional scales, alignment charts and proportional charts. The use of determinants in the construction of alignment charts. Prerequisite, Mathematics 2, 6 or 29. 1 class hour, 1 3-hour laboratory period. Credit, 2.

95. (I) Professional Seminar

Presentation of papers on important subjects and recent development in the field of mechanical engineering. Prerequisite, Senior standing. 1 class hour. Credit, 1.

97. (I) 98. (II) Experimental Mechanical Engineering

Special work in mechanical engineering for a senior thesis. Admission by permission of instructor. Credit, 3.

INDUSTRIAL ENGINEERING

26. (Summer) Tool Engineering

The principles of design of jigs, fixtures, dies and gauges. The economics of tooling as influenced by intermittent or continuous manufacturing and by volume. Prerequisite, Mechanical Engineering 28. 3 40-hour weeks. Credit, 3.

INDUSTRIAL ENGINEERING

51. (I) Industrial Management Principles

The principles of organization and management and their application to the problems of the industrial plant. For industrial engineering majors. Prerequisite, Junior standing. 3 class hours. Credit, 3.

53. (I) Methods and Standards Engineering

The principles involved in the simplification of the work pattern, the design of the work place, and in the establishment of production standards. Prerequisite, Statistics 77, previously or concurrently. 3 class hours, 1 3-hour laboratory period. Credit, 4.

54. (II) Engineering Economy

A study of the bases for comparison of alternatives in engineering projects, break-even and minimum cost points, evaluation of proposals, the economic selection and replacement of structures and machines. Prerequisites, Economics 25; Mathematics 6; Industrial Engineering 79. 3 class hours. Credit, 3.

56. (II) Data Processing

Principles and applications of data processing and electronic computer systems for use in management for control and decision making. Prerequisite, Industrial Engineering 51 or approval of instructor. 3 class hours. Credit, 3.

72. (II) Principles of Engineering Statistics

A study of statistical principles as applied to engineering problems including: analysis of variance, design of experiments, sampling plans, statistical quality control, industrial problem solutions. Prerequisite, Statistics 77. 3 class hours. Credit, 3.

75. (I) Job Evaluation

The principles used to determine an evaluation of all occupations in order to establish an equitable rating between them, to establish sound wage and salary policies. Prerequisite, Industrial Engineering 51. 2 class hours. Credit, 2.

77. (I) Factory Planning and Layout

The principles applying to the determination and development of the physical relationship between plant, equipment and operators considering the economy and effectiveness of operation. Prerequisites, Mechanical Engineering 2; Industrial Engineering 79 previously or concurrently. 1 class hour, 1 3-hour laboratory period. Credit, 2.

78. (II) Production Control

A study of the principles used to regulate production activities in keeping with the manufacturing plan. Prerequisites, Industrial Engineering 51; Industrial Engineering 79 concurrently. 3 class hours. Credit, 3.

79. (I) Industrial Engineering Problems

The theory of probability, the principles of mathematical programming applied to the solution of problems in inventory control, production control, quality control, production standards, work measurement. Prerequisites, Industrial Engineering 53; Mathematics 57; Statistics 77. 3 class hours. Credit, 3.

80. (II) Cost Control Engineering

The principles for pre-determining expenses for the factors of production, the comparison of results with estimates to determine and deal with the causes of expense variations. Prerequisites, Industrial Engineering 51 and 79. 3 class hours. Credit, 3.

86. (II) Industrial Engineering Principles

Industrial engineering principles as applied to organization, plant location, plant layout, industrial costs, production control, production standards, incentives. For engineering students other than industrial engineering majors. Prerequisite, Junior standing. 3 class hours. Credit, 3.

88. (II) Motion and Time Study

The combined fields of motion study and time study. For junior and senior students outside the industrial engineering field. Prerequisite, Junior standing. 2 class hours, 1 3-hour laboratory period. Credit, 3.

96. (II) Professional Seminar

Presentation of papers on important subjects and recent development in the field of industrial engineering. Prerequisite, Senior standing. 1 class hour. Credit, 1.

97. (I) 98. (II) Industrial Engineering Projects

Special work in industrial engineering for a senior thesis or an honors program. Admission by permission of the instructor. Credit, 1-3.

ENGLISH

Head of Department: Professor Howard O. Brogan.* Professors Copeland[1-2], Helming, Kaplan, Musgrave, O'Donnell[1], Varley; Associate Professors Clark, Koehler, Lane, Langland, Mitchell[2], Page[1-2], Williams; Assistant Professors Barron[1], Chametzky, Collins, Duckert, Gozzi, Haven, Hogan, Horrigan, McCarthy, Ratner, Rudin, Silver, Weston; Mrs. Boas, Mrs. Chametzky, Mrs. DuBois, Mrs. Galvin, Mrs. Grahame, Mrs. Hinckley, Mrs. Leininger, Mrs. Michelman, Mrs. Reid, Mrs. Rowe, Mrs. Smith, Mrs. Wright, Miss Dunn**, Messrs. Crouse, Hicks, Kenseth, Kidder, LaBranche, Madeira, Moser, Olmsted, Racine, Shepardson, Smith, Tucker, Wolf.

F. (I) (II) English for Foreign Students

Drill in English grammar and idiom; individual conferences on particular difficulties; introduction to contemporary American literature. Students having to meet the English 1, 2 requirement, who show proficiency in this course may, upon recommendation of the instructor, continue with English 2 on completion of this course. 2 class hours, 1 laboratory period. Credit, 0.

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[1] On leave first semester of 1961-62.

[2] On leave second semester of 1961-62.

* As of September 1, 1962.

** Visiting Lecturer.

ENGLISH

1. (I) (II) 2. (I) (II) English Composition

Training in effective exposition; analysis of college-level readings. 2 class hours. Credit, 2.

25. (I) (II) 26. (I) (II) Masterpieces of Western Literature

A study of selected masterpieces. The course aims to enrich the student's appreciation of literary values and develop his understanding of abiding human issues. 3 class hours. Credit, 3.

50. (I) (II) Technical Writing

For majors in engineering. A course in factual and inductive exposition with special emphasis upon process reports and theses. 2 class hours. Credit, 2.

51. (I) Advanced Expository Writing

The writing of informative prose in the forms expected in the students' major fields: reports, articles, essays. 3 class hours. Credit, 3.

52. (II) Advanced Technical Writing

Case studies in engineering and industrial reporting, advertising and promotional literature, scientific journalism, and graphic techniques. Given in alternate years. Prerequisite, a grade of A or B in English 50 or 51 or permission of the instructor. 3 class hours. Credit, 3.

53. (I) (II) Creative Writing

Intensive practice in writing prose fiction, with some attention to other forms, supplemented by discussion of ideas and techniques in contemporary literature. Prerequisite, a grade of A or B in English 1 or 2, or permission of the instructor. 3 class hours. Credit, 3.

54. (I) (II) Creative Writing

A continuation of English 53, allowing choice of emphasis upon short stories, poetry, drama, or novel. Prerequisite, a grade of A or B in English 53, or permission of the instructor. 3 class hours. Credit, 3.

55. (I) Early American Literature

Significant American writing during the Colonial, Revolutionary, and early Federalist periods. Given in alternate years. 3 class hours. Credit, 3.

56. (II) American Poetry

American poetry from 1800 to the emergence of a modern style early in the twentieth century. 3 class hours. Credit, 3.

57. (I) Major American Writers

Selected major American writers of the nineteenth and twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, James, Adams, Fitzgerald, and Hemingway. 3 class hours. Credit, 3.

58. (II) Major American Writers

Selected major American writers of the nineteenth and twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Twain, Crane, Dreiser, Wolfe, and Faulkner. 3 class hours. Credit, 3.

60. (II) History of the English Language

The development of English, including a study of vocabulary and usage levels, grammars, and dictionaries. Special attention to matters crucial to the teaching of English in secondary schools. 3 class hours. Credit, 3.

61. (I) History of English Literature

A study of the major phases of English literary history. Representative writers from Chaucer to Dryden will be examined. 3 class hours. Credit, 3.

62. (II) History of English Literature

A study of representative English writers from the eighteenth century to the present. A continuation of English 61 but may be elected independently. 3 class hours. Credit, 3.

63. (I) Literary Criticism

An introduction to the history of literary criticism. Chief emphasis given to the major philosophical critics, from Plato and Aristotle to the nineteenth century. 3 class hours. Credit, 3.

64. (II) Literary Criticism

An examination and application of techniques of criticism, with special consideration of the twentieth century. 3 class hours. Credit, 3.

66. (II) Chaucer

The major works, especially *Troilus* and selected *Canterbury Tales,* as combinations of medieval art and thought with pre-Renaissance motifs and Chaucer's genius for realism. 3 class hours. Credit, 3.

67. (I) Shakespeare

The dramatic art of Shakespeare as revealed in a study of approximately twenty plays. 3 class hours. Credit, 3.

68. (II) Shakespeare

An intensive study of five plays, directed toward a scholarly appreciation of Shakespeare as a dramatic artist. May be elected independently of English 67. 3 class hours. Credit, 3.

69. (I) The Renaissance in England

The non-dramatic literature of Tudor and Jacobean England in terms of emergent forms and literary ideas. Special attention to More, Spenser, Bacon, and Thomas Browne. 3 class hours. Credit, 3.

70. (II) Elizabethan and Jacobean Dramatists

Non-Shakespearian dramatists of the English Renaissance. A study of the major plays of Marlowe, Jonson, Beaumont, Fletcher, Tourneur, Webster, and Ford. 3 class hours. Credit, 3.

72. (II) Greek Classics (in translation)

Homer, lyric poetry, the major dramatists, selected dialogues of Plato, Thucydides, and their relations to the classical tradition in English literature. 3 class hours. Credit, 3.

73. (I) Seventeenth-Century Poetry, 1600-1660

A study of such representative poets as Donne, Jonson, Herrick, Lovelace, Suckling, Herbert, Vaughan, Crashaw, Traherne, and Marvel, with emphasis upon the Metaphysical Tradition. 3 class hours. Credit, 3.

74. (II) Milton

Development of the mind and art of Milton as a figure of the English Reformation and the late Renaissance, with emphasis on *Paradise Lost*. 3 class hours. Credit, 3.

75. (I) English Literature of the Restoration

Intellectual, moral, and literary values of the Restoration period from 1660 to 1700. Emphasis on Dryden's satire, the Restoration theater, and Congreve's comedy of manners. 3 class hours. Credit, 3.

77. (I) English Literature of the Eighteenth Century

The literature of the Augustan Age, with special emphasis on the writings of Swift and Pope. 3 class hours. Credit, 3.

78. (II) English Literature of the Eighteenth Century

The literature of the later eighteenth century with special emphasis on the Johnson Circle. A continuation of English 77 but may be elected independently. 3 class hours. Credit, 3.

79. (I) The Romantic Poets

A study of the Romantic Movement as revealed in the poetry and prose of Wordsworth, Coleridge, and the other early Romantics. 3 class hours. Credit, 3.

80. (II) The Romantic Poets

A further study of the Romantic Movement, with particular attention to Byron, Shelley, and Keats. 3 class hours. Credit, 3.

81. (I) English Prose of the Nineteenth Century

A study of the techniques and ideas of the chief prose writers, including Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincey, Carlyle, and Ruskin. 3 class hours. Credit, 3.

82. (II) English Prose of the Nineteenth Century

The chief Victorian prose writers, including Macaulay, Newman, Arnold, Mill, Huxley, Pater, and Stevenson. A continuation of English 81 but may be elected independently. 3 class hours. Credit, 3.

83. (I) The Development of the English Novel

The reading and discussion of eight or nine great English novels from Defoe through the Victorians. 3 class hours. Credit, 3.

84. (II) Victorian Poetry

An exploration of the range and diversity of Victorian poetry, with special attention to Tennyson, Browning, Arnold, and the Pre-Raphaelite Movement. 3 class hours. Credit, 3.

85. (I) Modern European Drama (in translation)

Major modern dramatists beginning with Ibsen and including Chekhov, Pirandello, Strindberg, Giraudoux, Shaw, and others. Emphasis on comparative currents in various European nations. 3 class hours. Credit, 3.

87. (I) Modern Novel: 1890-1920

The expanding form of the novel and increasing interest in social causes as exhibited in some twelve novels. 3 class hours. Credit, 3.

88. (II) Modern Novel: 1920-1950

An analytical presentation of some twelve novels. A continuation of English 87 but may be elected independently; no English major may, however, elect both English 87 and 88. 3 class hours. Credit, 3.

89. (I) Modern Poetry

An analysis of twentieth-century poetry developing from such authors as Hardy, Hopkins, Whitman, and Emily Dickinson to those of the present. 3 class hours. Credit, 3.

90. (II) Modern British and American Drama

A study of representative dramatists since the late nineteenth century, including Shaw, Fry, O'Casey, O'Neill, Williams, and others. Emphasis on changing trends in twentieth-century dramatic art. 3 class hours. Credit, 3.

95. (I) Seminar in English Literature or Comparative Literature in Translation

For English majors, but open to others by permission of the instructor. 3 class hours. Credit, 3.

96. (II) Seminar in American Literature

For majors but open to others by permission of the instructor. 3 class hours. Credit, 3.

ENTOMOLOGY AND PLANT PATHOLOGY

Head of Department: Professor J. H. Lilly. Professors Shaw, Sweetman, Wheeler; Associate Professors Hanson, King; Assistant Professors Banfield, Smith, Rohde.

26. (I) (II) General Entomology

A brief survey of the entire field of entomology: structure, development, classification, biology, and control of insects. Formation of an insect collection. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Lilly, Miss Smith.

53. (I) Principles of Agricultural Entomology

The more important insect pests, including their identification, life histories, damages and methods of control. The general principles of pest control receive special attention. Prerequisite, Entomology 26. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wheeler.

55. (I) 56. (II) Classification of Insects (1963-64)

The identification of insects, including immature stages. First semester: Orthoptera, Hemiptera, Coleoptera; second semester: other orders. Either semester may be elected independently. Given in alternate years. Prerequisites, Entomology 26. 3 2-hour laboratory periods. Credit, 3. Miss Smith.

57. (I) Insect Morphology (1962-63)

The external and internal anatomy of the major orders, with stress on phylogenetic relationships, as background for subsequent work in taxonomy and physiology. Given in alternate years. Prerequisite, Entomology 26. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Hanson.

60. (II) Structural Pest Control

Identification, biology and specific control measures of arthropod and rodent pests in structures, foods, fabrics, and miscellaneous products during transportation and in homes. Prerequisites, Zoology 1; Entomology 26 desirable. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Sweetman.

72. (II) Forest and Shade Tree Insects

The principles and methods of controlling insects which attack trees and forest products. A study of important species, their identification, biology, and specific control measures. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hanson.

74. (II) Medical and Veterinary Entomology (1963-64)

Relationships of insects and their allies to the health of man and animals. The classification, biology and control of these pests. Given in alternate years. Prerequisite, Entomology 26. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Shaw.

79. (I) Animal Ecology

Relations of animals to their physical and biotic environment, with observations and quantitative measurement of these factors and responses in the field and laboratory. Prerequisites, Entomology 26 or Zoology 1. 2 class hours, 1 2-hour laboratory periods. Credit, 3. Mr. Sweetman.

80. (II) Insect Control (1962-63)

The science of pest control: chemical, biological, ecological, mechanical and legislative. The need, application, economics, effectiveness and hazards from insecticides and biological control are emphasized. Given in alternate years. Prerequisites, Entomology 53, 55, 57 or equivalent; 79 and 81 desirable. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Sweetman.

81. (I) Insect Physiology

Detailed consideration is given to the organ systems, showing the functions such as nutrition, respiration, and growth, and the relationship of physiology to behavior. Prerequisites, Entomology 26 and Zoology 35; Entomology 55, 56, and 57 desirable. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Sweetman.

83. (I) Arthropods Other Than Insects

Arthropods are studied from the phylogenetic standpoint, with special reference to their relationship to the origin and evolution of insects. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hanson.

89. (I) Entomology Techniques

Theory and practice in the preservation, preparation, and mounting of insects for study and display. Excess graduation credits are necessary for election. Prerequisites, Entomology 26 and permission of instructor. 2 2-hour laboratory periods. Credit, 2. Miss Smith.

90. (I) (II) Evolution

The course and dynamics of both inorganic and organic evolution are treated, as are the implications of evolutionary concept on human philosophy, behavior and welfare. 3 class hours. Credit, 3. Mr. Hanson.

97. (I) 98. (II) Special Problems in Entomology

Supervised problem work in entomology or beekeeping for qualified students. Prerequisites, Entomology 26 and permission of staff. Credit 1-3. The Staff.

APICULTURE

66. (II) Beekeeping (1962-63)

Honeybees and their relatives, structure and biology of bees, methods of management, diseases, pollination, queen rearing, honey production, and history of beekeeping are included. Given in alternate years. Prerequisite, Entomology 26 or Zoology 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Shaw.

85. (I) Advanced Beekeeping (1963-64)

Provides detailed knowledge of bees and their management, including processing, grading and packaging honey. Beeswax, diseases, poisoning, pollination, behavior and current problems are considered. Given in alternate years. Prerequisite, Entomology 66. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Shaw.

ARBORICULTURE

51. (I) Principles of Arboriculture

Maintenance of shade and ornamental trees and selection of desirable tree species. Development of municipal and private shade tree programs. Student Insurance Policy mandatory. Prerequisite, a year of biological science. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. King.

PLANT PATHOLOGY

51. (I) General Plant Pathology

A basic course in plant pathology dealing with the nature, cause and control of plant diseases; epidemiology, diagnosis and control receive special attention. Prerequisite, a course in Botany. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Banfield.

52. (II) General Plant Pathology

An extension of Course 51 in which representative disease problems are studied in greater detail. Student may select problems related to his major field. Prerequisite, Plant Pathology 51. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Banfield.

69. (I) Forest and Shade Tree Pathology

The nature, cause and control of the principal types of disease in trees, including decay of forest products, and of standing and structural timbers. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Banfield.

75. (I) Methods in Plant Pathology

The general techniques and specialized methods used in the investigation of plant diseases, including isolation, culture and pathogenicity studies of representative plant pathogenes. Prerequisite, Plant Pathology 51. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Banfield.

78. (II) Nematology

Anatomy, morphology and classification of plant-parasitic and other soil-inhabiting nematodes. Parasitic relationships with plants and current control measures will be stressed. Prerequisite, a year of biological science. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Rohde.

90. (II) Insect Transmission of Plant Diseases

The interrelationships between insects, plants, microorganisms and environment are considered in relation to the development of plant diseases, emphasizing various roles played by arthropods. Prerequisite, a year of biological science. 3 class hours. Credit, 3. Mr. Banfield.

97. (I) 98. (II) Special Problems in Plant Pathology

Supervised problem work in plant pathology, including nematology, for qualified students. Prerequisites, Plant Pathology 51 and permission of staff. Credit, 1-3. The Staff.

FOOD TECHNOLOGY

Head of Department: Professor William B. Esselen. Professors Fagerson, Levine; Associate Professors Francis, Hayes; Assistant Professors Cournoyer, El-Bisi, Hultin, Nawar, Sawyer, Wrisley; Mr. Hunting.

51. (I) Introductory Food Technology

A basic course, primarily for food technology majors, covering food manufacture, processing, distribution and spoilage problems. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Hultin.

52. (II) Food Products

The composition of food products. Changes that occur in the chemistry of foods during storage and processing. Enzymes in the food industry. Prerequisite, Food Technology 51. 2 class hours, 1 4-hour laboratory period alternate weeks. Credit, 3. Mr. Hultin.

61. (I) Industrial Technology

A survey of commercial practices in the manufacture and preservation of food products. Prerequisites, Food Technology 52; Agric. Eng. 81. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Levine.

62. (II) Industrial Technology

A continuation of Course 61. Plant visits are made including a two-day field trip to food plants in the Boston area. Prerequisite, Food Technology 61. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Levine.

75. (I) and (II) Food Preservation

For students not majoring in food technology. The important food products, with emphasis on raw materials used, processing methods and examination of packaged foods. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Hultin.

91. (I) Analysis of Food Products

Physical, chemical, microbiological and microscopical methods will be employed. Prerequisites, Food Technology 52; Bacteriology 31; Chemistry 30. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Hunting.

92. (II) Objective Analytical Methods and Instrumentation

A continuation of Course 91. Prerequisite, Food Technology 91. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Hunting.

94. (II) Sensory Evaluation Methods

An introduction to sensory measurements in the evaluation and acceptance of foods. Panel tests and their statistical interpretation; taste, odor, color, and texture measurements. For seniors only. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Sawyer.

95. (I) 96. (II) Food Science Literature

For seniors who specialize in food technology. 2 class hours. Credit, 2. Staff.

FOOD MANAGEMENT

33. (I) Introductory Food Management

An introductory course in restaurant and hotel operations. 3 class hours. Credit, 3. Mr. Wrisley.

77. (I) Food Service Practices

Functional study of personnel. Advertising and promotion methods. Labor procurement and policies. Job training and evaluation. Cost controls. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Cournoyer.

78. (II) Stewarding

A study of practices used by the food service industry pertaining to purchasing, receiving, and issuing food, beverages, and other supplies. Principles of food and beverage cost control. 3 class hours. Credit, 3. Mr. Wrisley.

81. (I) Hotel Practice

Elements of hotel management. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Cournoyer and Mr. Wrisley.

82. (II) Laws of Innkeeping (Institution Law)

Law as applied to hotels and food service establishments; includes a consideration of bailments, torts, regulations, insurance, and sanitation. Prerequisite, General Business 71. 3 class hours. Credit, 3. Mr. Cournoyer.

95. (I) 96. (II) Food Management Seminar

Survey of current food service literature and reports. Outside speakers on selected professional topics. 2 class hours. Credit, 2. Staff.

FORESTRY AND WILDLIFE MANAGEMENT

Head of Department: Professor Arnold D. Rhodes. Professor Gatslick; Associate Professors Greeley, MacConnell, Mader; Assistant Professor Abbott; Messrs. Bond*, Foster, Mawson.

25. (I) Wood Anatomy and Identification

A basic anatomical study of wood elements, their various structural characteristics and functions; practice in identification. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Gatslick.

26. (II) Dendrology

The taxonomic features, silvical characteristics, and distribution of the principal tree species of temperate North America; a description of the forests where they occur. Prerequisite, Botany 1. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Abbott.

52. (II) Properties of Wood

The physical and chemical characteristics of woods in relation to its use; the influence of growth upon wood properties; methods of testing. 3 class hours. Credit, 3. Mr. Gatslick.

53. (I) Silvics

Forest ecology as a foundation for silviculture; environmental factors and their effect upon vegetation; development and classification of trees and forest communities; forest influences. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Mader.

54. (II) Forest Soils

Effects of soil properties on tree growth; relationship of soils to silviculture, harvesting, watersheds, wildlife, and range management; forest soil description, classification and mapping. Prerequisite, Agronomy 22. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Mader.

55. (I) (1963-64) and (Summer) The Elements of Forest Mensuration

The measurement of trees, stands, and forest products; field and office practice in timber estimating and log scaling; collection and compilation of forest inventory data. 2 class hours, 1 4-hour laboratory period. Credit, 3. Summer course, 3 44-hour weeks. Mr. Mawson, Mr. MacConnell.

56. (II) The Principles of Silviculture

Establishment and culture of forests for the production of wood crops; regeneration and intermediate cuttings, chemical silvicides, prescribed burning, site treatment, slash disposal. Prerequisite, Forestry 53 recommended. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Rhodes.

57. (I) Forest Economics and Policy

Development of land use and legislation affecting forest policy in the U. S. Timber resources distribution, consumption and demand, taxation, credit, and social-economic factors. 3 class hours. Credit, 3. Mr. Foster.

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* On Leave of Absence.

59. (I) Forest Protection

Principles of protecting forests from fire, insects, diseases, domestic animals, wildlife, and atmospheric agencies with special emphasis on the prevention and control of forest fires. 3 class hours. Credit, 3. Mr. Abbott.

71. (I) Aerial Photogrammetry

Principles of photogrammetry in forest management, wildlife biology, and other fields concerned with large land surfaces. Photographic interpretation and map making from aerial photographs. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. MacConnell.

74. (II) Lumber Manufacture and Distribution

The lumber industry; milling and processing, log and lumber grading, lumber storage and distribution. 3 class hours. Credit, 3. Mr. Foster.

75. (I) Forest Products

A survey of the principal forest products, their manufacture and distribution. 3 class hours. Credit, 3. Mr. Gatslick.

78. (Summer) Harvesting of Forest Products

Basic concepts of harvesting methods with emphasis on supervision. Field exercises in harvesting techniques followed by a week's trip visiting industrial forest operations. 3 44-hour weeks. Credit, 3. Mr. Foster, Mr. MacConnell.

80. (II) Principles of Forest Management

Multiple-use management of forest land, organization of the forest for sustained-yield management. Preparation of a management plan for a 10,000-acre forest. Prerequisite for the laboratory, Forestry 55. 3 class hours, 1 4-hour laboratory period. Laboratory period optional for non-forestry majors. Credit, 5. or 3. Mr. MacConnell.

81. (I) Regional Silviculture

The application of silvicultural practices to the forests of the United States and Canada; the ecological and economic factors affecting management. Prerequisite, Forestry 56. 3 class hours. Credit, 3. Mr. Rhodes.

82. (II) Artificial Propagation of Forests, and Forest Tree Improvement

Reproductive characteristics of trees; artificial propagation of forest stands by direct seeding and planting; nursery management; and forest tree improvement through provenance tests, selection and hybridization. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Abbott.

84. (II) Advanced Forest Mensuration

The analysis of growth and yield in forest stands; construction of standard volume tables and yield tables; plotless cruising and continuous forest inventory. Prerequisite, Forestry 55. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Mawson.

85. (I) Wood Seasoning and Preservation

Properties of wood in relation to drying and preservation; theory and practice of air seasoning, kiln drying, and preservative treatment. 3 class hours. Credit, 3. Mr. Gatslick.

97. (1) 98. (II) Selected Problems

Individual work on an assigned problem or project in forest management or wood utilization. For qualified juniors and seniors. Total credits for two semesters not to exceed six. Credit, 2-4. The Staff.

WILDLIFE MANAGEMENT

27. (I) Conservation of Natural Resources

Natural resources of the United States including soil, water, forests, wildlife, and the important minerals; conservation problems in relation to national prosperity. 3 class hours. Credit, 3. The Staff.

61. (I) Principles of Wildlife Management

Fundamental ecology and principles of wildlife management with emphasis on population characteristics and responses. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

62. (II) Techniques of Wildlife Management

Methods of collecting and interpreting data in wildlife management with emphasis on field and laboratory experience in census methods and criteria for determining sex, age and other characteristics of wild birds and mammals. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

63. (I) Management of Wetland Wildlife (1962-63)

Life histories, identification and habitat requirements of waterfowl and marshland furbearing animals; management of wetland habitats. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

64. (II) Management of Upland Wildlife (1963-64)

Life histories, identification, and habitat requirements of upland game birds, game mammals, and furbearers; management of upland habitats. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Greeley.

97. (I) 98. (II) Special Problems in Wildlife Management

Qualified seniors who have completed most of the wildlife courses may arrange for work on a special problem in a selected phase of wildlife management. Total credits for two semesters may not exceed 6. Credit, 2-4. Mr. Greeley, Mr. Sheldon.

GEOLOGY

Head of Department: Professor H. T. U. Smith. Professor Farquhar; Associate Professor Motts; Assistant Professors Burke, Johansson, McGill, Nelson, Webb; Mr. Rice.

1. (I) (II) Physical Geology

The nature and origin of the landscape features of the earth, and their underlying rocks and structures; including the work of rivers, waves and currents, wind, and glaciers; and the role of earthquakes, volcanoes, and the processes of mountain-building. 2 class hours, 1 3-hour laboratory period, and field trips. Credit, 3.

2. (I) (II) Historical Geology

Origin and age of the earth; interpretation of the geologic time scale; development on continents and oceanic basins and their relief features; evolution of life. Prerequisite, Geology 1. 2 class hours, 1 3-hour laboratory period and field trip. Credit, 3.

33. (II) Structural Geology

Principles of deformation of the earth's crust; occurrence and recognition of rock structures; graphic solution of structural problems; field observations. Prerequisite, Geology 1. 1 class hour, 2 2-hour laboratory periods and field trips. Credit, 3. Mr. Farquhar.

42. (I) Mineralogy

Chemical composition, physical properties, crystal form, occurrence, and identification of common minerals. Prerequisites, Chemistry 1 and 2. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Nelson.

50. (I) Engineering Geology

Not open to geology majors. Materials and surface features of the earth with emphasis on engineering problems; map reading as related to the phenomena of physical geology. 2 class hours, 1 3-hour laboratory period or field trip. Credit, 3. Mr. Farquhar.

56. (II) Lithology

Study of the classes of rocks with reference to manner of origin, modes of occurrence, structural features and chemical and petrographic distinction within each group. Prerequisites, Geology 1, 42. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Nelson.

63. (I) Invertebrate Paleontology

A study of the history, development and identification of invertebrate animal fossils. Field trips by arrangement. Prerequisites, Geology 2; Zoology 1. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Johansson.

64. (II) Plant Paleontology

A study of the history, development, and identification of plant fossils. Field trips by arrangement. Not offered 1962-63. 1 class hour, 2 2-hour laboratory periods. Credit, 3.

72. (I) Geologic Field Mapping

An introduction to the instruments and techniques used in field mapping. and their application to the geologic mapping of selected areas. Prerequisites, Geology 33, 56. 8 field hours. Credit, 3. Mr. McGill.

74. (II) Sedimentology

A study of the composition, classification, and origin of sedimentary rocks, including discussion of source area, mode of transportation and deposition, and diagenesis. Prerequisites, Geology 1, 2, 42. 2 class hours and laboratory period. Credit, 2. Mr. Motts.

78. (II) Principles of Stratigraphy

The principles of stratigraphic correlation and their application to the problems of the major rock units primarily of the United States. Prerequisites, Geology 1, 2. Course 33 and 74 recommended. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Webb.

89. (I) Geomorphology

Origin and development of landforms in relation to geological processes, climatic environment, and tectonic history. Application of geomorphic methods to interpretation of Cenozoic geologic history. Prerequisites, Geology 1, 2, 33. 2 class hours, 1 2-hour laboratory period. Credit, 3.

91. (II) Photogeology

A laboratory study of the instruments and methods employed in making measurements and preparing base maps and geologic maps from vertical and oblique aerial photos. Prerequisites, Geology 33, 72. 2 2-hour periods. Credit, 3. Mr. Smith.

94. (II) Pleistocene Geology

Geochronology of Pleistocene time as related to climatic changes and their influence on glaciology, landforms, sedimentary deposits, sea level, and the paleontological record. Prerequisite, Geology 2 or permission of the instructor. Course 89 recommended. 2 class hours; field trips by arrangement. Credit, 3. Mr. Motts.

96. (II) Seminar

Review of current literature or discussion of selected topics. Credit, 1.

97. (I) 98. (II) Special Problems

For seniors specializing in geology. Total credit may not exceed 6. Prerequisite, 21 hours of geology or permission of department. Credit, 1-6. The Department.

GEOGRAPHY

35. (I) Fundamentals of Geography

A systematic introduction to the study of physiography, climate, mineral resources, and man's use of his natural environment. 2 class hours, 1 2-hour laboratory period, and field trips. Credit, 3. Mr. Burke.

50. (II) Geography of North America

A regional approach to the study of the physical geography of the continent and its development by man. 3 class hours. Credit, 3. Mr. Burke.

55. (I) Economic Geography

The distribution, production and utilization and of the natural resources and commodities on which man's livelihood depends and the problems which they pose. 3 class hours. Credit, 3. Mr. Burke.

81. (II) World Political Geography

The human and physical environments in which states exist and the problems which these environments pose in their current and likely future behavior. 3 class hours. Credit, 3. Mr. Burke.

GERMAN AND RUSSIAN

Head of the Department: Professor Frederick C. Ellert. Professors Heller, Weigand; Assistant Professors Anderle, Butler, Hauser; Miss Schiffer, Messrs. Lea Pastuhov, Schafer, Stawiecki.

1. (I) 2. (II) Elementary German

Conversation, reading, grammar, and composition. 3 class hours, 1 laboratory hour. Credit, 3.

25. (I) 26. (II) Intermediate German

Reading, conversation, composition. Grammar review. Prerequisites, German 1 and 2. 3 class hours, 1 laboratory hour. Credit, 3.

51. (I) Nineteenth Century Prose

The *Novelle* from early realism to naturalism. Emphasis on literary and social forces in Tieck, Stifter, Keller, Storm, C. F. Meyer. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Anderle.

52. (II) Poetry and Drama of the Nineteenth Century

Plays of Kleist, Grillparzer, Hebbel, Hauptmann. The poetry of Mörike, Lenau, Droste-Hülthoff, Nietzsche. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Hauser.

53. (I) Twentieth Century Prose

Main literary currents from Nietzsche to Hesse. Particular attention to the works of Thomas Mann, Kafka, and Werfel. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Heller.

54. (II) Poetry and Drama of the Twentieth Century

Poetry of Hofmannsthal, George and Rilke. Plays of Hauptmann, Kaiser, Brecht and others. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Lea.

55. (I) Storm and Stress

Eighteenth century Titanism in German literature centering in the early Goethe. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Ellert.

56. (II) Romanticism

Poetry and prose of the romantic period from Hölderlin to Heine. Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Ellert.

57. (I) Goethe's *Faust*

Prerequisites, German 25 and 26. 3 class hours. Credit, 3. Mr. Heller.

59. (I) The Germanic Languages

Introduction to general and Germanic philology. Historical development particularly of German and English and their relationship to other languages of the Indo-European family. 3 class hours. Credit, 3.

60. (II) The Classical Period

Representative works of Lessing, Goethe, and Schiller. Prerequisites, German 25, 26. 3 class hours. Credit, 3. Mr. Heller.

67. (I) German Masterpieces in Translation

Literary works ranging from the Middle Ages to the present. Admission by permission of department. 3 class hours. Credit, 3.

70. (II) Scientific German

Expository prose. Prerequisites, German 25, 26, or equivalent. 3 class hours. Credit, 3. Mr. Stawiecki.

77. (I) Survey of German Literature I

German literature from the Middle Ages to the Age of Enlightenment. Prerequisites, German 25, 26 or equivalent. 3 class hours. Credit, 3.

78. (II) Survey of German Literature II

German literature from 1770 to the present. Prerequisites, German 25, 26 or equivalent. 3 class hours. Credit, 3.

79. (I) 80. (II) German Conversation and Composition

Practice in the oral and written language. Prerequisites, German 25 and 26, or permission of instructor. 4 class hours. Credit, 3. Miss Schiffer.

97. (I) 98. (II) Special Problems

Guided reading and research in areas of specialization. For qualified seniors. Credit, 3.

RUSSIAN

1. (I) 2. (II) Elementary Russian

Grammar, exercises in composition and conversation, selected readings. Prerequisite, previous language training. 3 class hours, 1 laboratory hour. Credit, 3.

5. (I) 6. (II) Intermediate Russian

A review of the fundamentals of grammar followed by more advanced study of grammatical structure and idiom. Composition, conversation, and readings in Russian fiction. Prerequisites, Russian 1, 2. 3 class hours, 1 laboratory hour. Credit, 3. Mr. Frink.

51. (I) 52. (II) Introduction to Russian Literature

Survey course in Russian prose. Written reports. Conducted in English. Readings in English, research in Russian for majors. Prerequisite, junior standing. 3 class hours. Credit, 3.

53. (I) 54. (II) Dostoevsky and Tolstoy in their European Setting

Historical and literary background. Close text analyses. Student reports. Reading of selected works in the original required of Russian majors. Prerequisite, junior standing. 3 class hours. Credit, 3.

55. (I) Masterpieces of Russian Literature in Translation

A representative selection will be made from the classics of Russian romanticism and realism, culminating in the novels of Dostoevsky and Tolstoy. Students majoring in Russian will be required to read some of the texts in Russian. Prerequisite, junior standing. 3 class hours. Credit, 3.

56. (I) Russian Drama

Russian Drama in the originals, from the beginnings to the establishment of a Russian national repertoire and theatre. Plays of Ostrovskij, Chekhov, and Gorky. Prerequisites, Russian 6 or the equivalent. 3 class hours. Credit, 3.

57. (I) Soviet Literature

Beginnings and development of Soviet prose, drama, criticism from Gorki to Sholoklov and Pasternak. Conducted in English; no knowledge of Russian required. Majors are required to do research in Russian. Prerequisite, junior standing. 3 class hours. Credit, 3.

58. (I) Russian Poetry

Russian poetry in the originals: 19th century to the present: Classical Heritage, Golden Age, Utilitarian poetry, Proletarian verse, Modernism, Symbolism, Mysticism, Acmeism, Fururism, Imagism, Constructivism. Prerequisites, Russian 6 or the equivalent. 3 class hours. Credit, 3.

61. (I) 62. (II) Advanced Russian

Building vocabulary and improving reading ability through selections from the Classical and Soviet Periods. Compositions and class-room discussions in Russian on reading material are required. Prerequisites, Russian 5 and 6. 3 class hours, I laboratory hour. Credit, 3.

63. (I) Scientific Russian

Intensive experience in translating scientific exposition, academic and journalistic prose. Prerequisites, Russian 6 or the equivalent. 3 class hours. Credit, 3.

64. (I) The History of the Russian Language

Historical development of the Russian language, its relation to other languages, changes in sound, form and vocabulary from the earliest period to the present. Prerequisites, Russian 61 and 62. Junior or Senior standing. 3 class hours. Credit, 3.

71. (I) Russian Conversation

A semester course devoted to developing fluency in speaking Russian and a conversational vocabulary. Prerequisites, Russian 61-62. 3 class hours, 1 laboratory hour. Credit, 3.

97. (I) Problems in Russian Language and Literature

A semester involving intensive and independent work on special problems in Russian Language and Literature, with results to be presented in written form. Required of majors. Prerequisites, Advanced Russian 61 and 62 and Senior Standing. Credits, 1-3.

GOVERNMENT

Head of Department: Professor John S. Harris. University Distinguished Professors in Public Affairs: Senator Earle Clements and Mr. Neil Staebler; Professors Beth, Fenton, Oppenheim; Associate Professors Goodwin, Vali; Assistant Professors Allen, Braunthal, Mainzer, Tinder; Visiting Professors Virginia Adloff and Gwendolen M. Carter.

25. (I) (II) American Government

A study of the principles, machinery, dynamics, and problems of government in the United States. 3 class hours. Credit, 3.

26. (II) European Government

A survey of the politics and governmental institutions of Great Britain, France, U.S.S.R., and other European countries. 3 class hours. Credit, 3.

51. (I) Municipal Government

A survey of the governmental structure and function of American municipalities. 3 class hours. Credit, 3. Mr. Goodwin, Mr. O'Hare.

52. (II) American Foreign Policy

An analysis of the principles of American foreign policy. Constitutional, political, and administrative considerations which influence the formulation and execution of American foreign policy. 3 class hours. Credit, 3. Mr. Allen, Mr. Braunthal.

53. (I) International Relations

The nation-state system and conceptions of national interest in modern world politics. Forms and distribution of power. Making of foreign policy and adjusting international conflict. 3 class hours. Credit, 3. Mr. Allen, Mr. Vali.

54. (II) State Government

A study of state politics, organization and functions, with emphasis on the role of the state in our Federal system. 3 class hours. Credit, 3. Mr. Goodwin, Mr. Fenton.

55. (Summer) The Presidency in American Government

Constitutional and political aspects of the presidency in legislation, administration and conduct of foreign and military affairs. The president as party leader. Prerequisite, Government 25. Credit, 3. Messrs. Goodwin, Fenton.

56. (II) The Legislative Process

The functions of national and state legislatures, legislative procedures, and the role played by political parties and pressure groups in the legislative process. 3 class hours. Credit, 3. Mr. Goodwin, Mr. Fenton.

57. (I) The Government and Politics of Russia

Organization and functioning of the Communist party; the administrative process; terror as a system of power; Soviet foreign policy, its formation and execution. 3 class hours. Credit, 3. Mr. Harris, Mr. Vali.

61. (I) Public Administration

A study of organization and management in modern government, with emphasis on the bureaucracy's role in public policy formation. 3 class hours. Credit, 3. Mr. Mainzer, Mr. Harris.

62. (II) Administrative Law

A study of governmental activities in the regulation of industry, agriculture, and labor, with emphasis on the legal framework within which these activities operate. 3 class hours. Credit, 3. Mr. Mainzer.

63. (I) Political Parties and Elections

A study of the American political process, with emphasis on parties, pressure groups, and public opinion. 3 class hours. Credit, 3. Mr. Fenton, Mr. Goodwin.

64. (II) The Law and Practice of Civil Liberties

Development in American Constitutional Law of the concept of civil liberty, including free speech and religion, fair trial, and race discrimination. Prerequisite, Government 25. 3 class hours. Credit, 3. Mr. Beth.

65. (I) Constitutional Law

An historical study of the United States Constitution as interpreted by decisions of the Supreme Court. 3 class hours. Credit, 3. Mr. Beth.

66. (II) American Political Thought

A study of the development of American political thought from colonial times to the present. 3 class hours. Credit, 3. Mr. Harris.

68. (II) International Law

A study of the origin, character, and function of international law. 3 class hours. Credit, 3. Mr. Braunthal, Mr. Vali.

70. (II) International Organization

A study of international organization in the twentieth century, with emphasis upon the United Nations and regional organizations. 3 class hours. Credit, 3. Mr. Braunthal, Mr. Vali.

71. (I) Ancient and Medieval Political Thought

A study of the development of political thought and its relation to cultural and institutional growth from the time of the Greeks to the end of the Middle Ages. 3 class hours. Credit, 3. Mr. Tinder, Mr. Oppenheim.

72. (II) Modern Political Thought

A study of the development of political thought and its relation to cultural and institutional growth from the rise of the modern state to the present. 3 class hours. Credit, 3. Mr. Tinder, Mr. Oppenheim.

76. (II) Public Opinion in Politics

A study of opinion and communication as aspects of the political process with emphasis upon communication through mass media. 3 class hours. Credit, 3. Mr. Mainzer.

78. (II) Municipal Administration

Administrative management in American municipalities based on descriptive literature, case materials, and personal observation, with particular attention to Massachusetts cities and towns. 3 class hours. Credit, 3. Mr. O'Hare, Mr. Mainzer.

80. (II) Municipal Law

A study of the legal problems encountered in the creation and operation of local government, with special reference to Massachusetts cities, towns, and counties. 3 class hours. Credit, 3. Mr. O'Hare.

83. (I) Public Personnel Administration

Theory, practice, and organization of the personnel functions in governmental administration, including recruitment, testing, classification, compensation, promotions, training, and employee relations. Prerequisites, Government 25, 61, or permission of instructor. 3 class hours. Credit, 3. Mr. Mainzer, Mr. Harris.

84. (II) Governmental Financial Administration

Theory, practice, and organization, including budgeting, revenues, debt operations, records administration, purchasing, audits, and financial reporting. Prerequisites, Government 25, 61, or permission of instructor. 3 class hours. Credit, 3. Mr. Harris, Mr. O'Hare.

91. (I) Scope and Methods of Political Science

Critical examination of the scope and unity of political science and the significant methodological positions and research techniques. Prerequisite, Government 25. 3 class hours. Credit, 3. Mr. Mainzer.

93. (I) (II) The Practice of American Politics

A course in practical American politics, given by a prominent political leader under the University Distinguished Professorship in Public Affairs. Prerequisite, Government 25. Credit, 3.

95. (I) 96. (II) Seminar

A study of special problems in the field of government. 3 class hours. Credit, 3.

HISTORY

Head of Department: Professor Harold W. Cary. Professors Caldwell, Potash*, Quint*; Associate Professors Davis, Gordon, Ilardi, Williams; Assistant Professors Brown, Cody, DePillis*, Gagnon*, Greenbaum, van Steenberg, Wickwire; Mrs. Gordon, Mrs. Wickwire, Miss Guimond, Messrs. Edmondson, Miller, Sonnino, Wilensky, Woehrlin. Visiting Associate Professors Mann, Visiting Assistant Professor Bernhard, Visiting Lecturers Leonard, Teall.

5. (I) 6. (II) Modern European Civilization

The historical development of the western European countries, their ideas and institutions. Either semester may be elected independently. 3 class hours. Credit, 3.

25. (I) 26. (II) The Development of American Civilization

A survey of the American national growth. Either semester may be elected independently. 3 class hours. Credit, 3.

31. (I) 32. (II) English History

Emphasis on economic, social, and cultural influences, as well as on constitutional development. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Caldwell, Mr. Wickwire.

51. (I) Ancient History

The development of civilization in the Ancient World. 3 class hours. Credit, 3. Mr. Williams.

53. (I) 54. (II) History of Far Eastern Civilization

A general historical introduction to the civilization and contemporary problems of the Far East. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Cody.

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* On Leave of Absence.

55. (I) 56. (II) A History of Russia

A survey of the political, economic, social and intellectual development of Russia. The first semester will treat the Tsarist era, the second, the origins of Russian Marxism and the Soviet period. Either semester may be elected independently. Prerequisites, History 5, 6. 3 class hours. Credit, 3. Mr. Woehrlin.

57. (I) Colonial Hispanic America

The age of the "conquistadores" to the independence movement. Emphasis on political, economic and social factors and the growth of institutions. 3 class hours. Credit, 3. Mr. Leonard.

58. (II) Modern Hispanic America

The nineteenth and twentieth centuries with emphasis on Argentina, Brazil and Mexico. 3 class hours. Credit, 3. Mr. Leonard.

62. (II) Medieval History

European history from the collapse of Rome to the Renaissance. 3 class hours. Credit, 3. Mr. Williams.

63. (I) 64. (II) History of American Thought and Culture

The basic strands of American thought and their reflection in American culture. First semester deals with the period before 1865. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Brown.

66. (II) The History of Modern Germany

The evolution and development of Germany since the accession of Frederick the Great with emphasis upon diplomatic, political, military and social-economic trends and problems. 3 class hours. Credit, 3. Mr. Gordon.

69. (I) Europe, 1870-1918

Internal developments of the principal countries; a detailed study of conditions and diplomacy which led to the World War; and military and diplomatic history of the war years. Prerequisite, History 6. 3 class hours. Credit, 3. Mr. van Steenberg.

70. (II) Europe since 1918

Major developments in the internal and international affairs of the European states since World War I. 3 class hours. Credit, 3. Mr. Caldwell.

72. (II) History of American Westward Expansion, 1763-1893

Advance of settlement from the Appalachians to the Pacific and the influence of the frontier upon social, economic, and political conditions. Prerequisite, History 25, or permission of instructor. 3 class hours. Credit, 3. Mr. Davis.

73. (I) 74. (II) The Age of the Renaissance and Reformation, 1300-1600

A study of the changes in European thought and institutions during the development of Humanism and the Protestant and Catholic Reformations. Either semester may be elected independently. 3 class hours. Credit, 3. Mr. Ilardi.

75. (I) Europe in the Enlightenment, 1685-1789

Civilization of Western Europe in the eighteenth century, its social milieu, intellectual setting, institutional forces, religious tendencies, aesthetic contributions, and the growth of revolutionary spirit. 3 class hours. Credit, 3. Mr. Greenbaum.

77. (I) Modern Britain

A study of selected topics on the political, social, and intellectual development of Britain in the nineteenth and twentieth centuries. 3 class hours. Credit, 3. Mr. Caldwell.

78. (II) France Since 1789

A study of selected, formative political crises from 1789 to the present, and their settings in the economic, social, and intellectual life of modern France. 3 class hours. Credit, 3. Mr. Gagnon.

79. (Summer) New England to 1860

A study of the colonial and early national periods, with emphasis on the political, social, and economic aspects of life in this region. Credit, 3. Mr. Cary.

81. (I) 82. (II) Diplomatic History of the United States

The development of American foreign relations, 1776 to the present. Either semester may be elected independently. Prerequisites, History 25, 26, or permission of the instructor. 3 class hours. Credit, 3. Mr. Cary.

83. (I) The Progressive Age (1900-1920)

A study of the political response to the changing economic and social conditions in American life. 3 class hours. Credit, 3. Mr. Wilensky.

84. (II) Conservatism and Reform (1920-1945)

American political, economic and intellectual life between the two World Wars. 3 class hours. Credit, 3. Mr. Wilensky.

90. (I) (II) Historiography and Historical Method

Training in location, appraisal, and handling of source materials. Critical evaluation of technique and ideas of representative historians from Thucydides to Toynbee. 3 class hours. Credit, 3. Mr. Greenbaum, Mr. Gordon.

95. (I) (II) Seminar in European History

A problems course intended to give training in historical research and writing. The field of study will vary from semester to semester. Prerequisites, History 5, 6. 3 class hours. Credit, 3.

96. (I) (II) Seminar in American History

Similar to History 95, but dealing with fields of American history. Prerequisites, History 25, 26. 3 class hours. Credit, 3.

HOME ECONOMICS

Dean: Professor Marion A. Niederpruem, Professor Burroughs, Associate Professors: Cook, D. Davis, Hawes, Merriam; Assistant Professors: V. Davis, McCullough, Merchant; Mrs. Boicourt, Mrs. Jarvesoo, Mrs. Myers, Mrs. Sullivan, Miss Weaver.

FOOD AND NUTRITION

27. (I) (II) Man and Nutrition

Fundamentals of the science of nutrition and its role in everyday life. Overview of the development of man's food habits encompassing psychological, social, economic and racial factors. 3 class hours. Credit, 3. Staff.

30. (II) Food Science and Preparation

Fundamental scientific principles and comparative methods of food preparation. Prerequisite, Chemistry 33. 2 class hours, 1 2-hour laboratory. Credit, 3. Miss D. Davis.

41. (I) Nutrition and Food Preparation

Combines the fundamentals of nutrition with food preparation and meal planning to meet nutritional requirements. For student nurses whose responsibility will be mostly with their patients. Registration by permission of the instructor. Prerequisites, Chemistry 1 and 2, Zoology 37. 2 class hours. 1 3-hour laboratory. Credit, 3. Mrs. Cook, Mrs. Boicourt.

51. (I) Meal Management

Consideration is given to money, time and energy expenditures and personal satisfactions in line with individual food requirements. The planning of meals according to the modern concepts of food preparation. Prerequisite, FN 30. 2 class hours, 1 3-hour laboratory. Credit, 3. Miss D. Davis.

52. (II) Advanced Nutrition and Dietetics

Absorption, utilization and interrelationship of food nutrients. Evaluation of factors that influence nutrient requirements. Critique of methods of determining nutrient requirements. Prerequisites, FN 27, 51, Chemistry 79, Zoology 35. 2 class hours. 1 2-hour laboratory. Credit, 3. Mrs. Cook.

56. (I) and (II) Principles of Food Preparation and Meal Planning

A survey course designed for non-major men and women. Basic food principles, food preparation and meal planning are emphasized. Reference to consumer food buying problems is included. 2 class hours, 1 3-hour laboratory. Credit, 3. Miss D. Davis, Mrs. McCullough.

72. (II) Quantity Food Purchasing

A study of food distribution processes as they influence the purchase of food (cereal, dairy and meat products, fruits and vegetables, and fish) at the quantity or institutional level. Prerequisites, Accounting 25 or equivalent, Economics 25. 3 class hours. Credit, 3. Mrs. McCullough, Coordinator, Messrs. Snyder, Buck, Evans and others.

73. (I) Nutrition During Growth and Development

Nutrition as it affects physical growth and development from prenatal through adolescence. Criteria for judging and studies of nutritional status of children. Opportunity for laboratory work in the Nursery School. Prerequisites, FN 27 or 52. 3 class hours. Credit, 3. Mrs. Cook.

89. (I) Nutrition in Disease

Physiological basis for the use of therapeutic diets in certain diseases. Current medical and nutrition literature used. Prerequisites, FN 52, Chemistry 79, Zoology 35 or equivalent. 3 class hours. Credit, 3. Mrs. Cook.

91. (I) Institutional Administration

Principles of organization, personnel management, sanitation, food service planning and equipment selection. Field trips in the area. Prerequisites, FN 51 or 56. 2 class hours, 1 4-hour laboratory or field trip. Credit, 4. Mrs. McCullough.

92. (II) Quantity Food Preparation

Experience in use of large equipment and application of principles of quantity food preparation, service and cost control. University Dining Hall and Amherst School Lunch Program utilized. Prerequisites, FN 51 or Food Management 33, FN 30. 2 class hours, 1 4-hour laboratory. Credit, 4. Mrs. McCullough.

94. (II) Experimental Foods

Investigation of experimental techniques and advanced knowledge related to the chemistry of food preparation. Original research projects included. For those interested in dietetics, food and nutrition in business or non-majors interested in foods. Prerequisites, FN 30 and 51; and/or Chemistry 33 or Chemistry 51 and 52 or permission of instructor. 2 class hours, 1 3-hour laboratory. Credit, 3. Miss D. Davis.

95. (1) (I) Seminar in Foods

Readings and discussions of foods based on the scientific literature. Designed primarily as a Senior course for majors in Food and Nutrition. Prerequisites, FN 30 and 51 or permission of instructor. 1 class hour. Credit, 1. Miss D. Davis.

95. (2) (I) Seminar in Institutional Administration

1 class hour. Credit, 1. Mrs. McCullough.

96. (II) Seminar in Nutrition

Individual reports and discussion of current research in nutrition. To be taken Senior year. Prerequisites, FN 27 or 52. 1-2 class hours. Credit, 1. Mrs. Cook.

97. (I) 98. (II) Problems in Foods, Nutrition or Institutional Administration

An intensive study of some phase of foods, nutrition or institutional administration. By permission of the staff adviser. Credit, 1-3. Staff.

TEXTILES, CLOTHING AND RELATED ARTS

21. (I) Man and Clothing

The impact of clothing and textiles, its sociological, psychological and economic implications to the individual and society, seen in historic and contemporary perspective. Prerequisites, Sociology 25, Psychology 1, Economics 25, or by permission of instructor. 3 class hours. Credit, 3. Miss V. Davis.

23. (I) Art for Living

Value identification and judgment through the study of design. Concepts basic to artistic expression. Illustrated lectures, field trips. 3 class hours. Credit, 3. Mrs. Jarvesoo.

24. (II) Textiles I

Introductory study of fibers, fabrics, finishes, quality, care and performance of textile products and their role in the economic and cultural development of society. 2 class hours, 1 2-hour laboratory. Credit, 3. Miss Hawes.

28. (II) Fundamentals of Clothing Construction

Fundamental principles of garment construction as a form of artistic expression from grain perfection to quality product with emphasis on accuracy, fit and finishing. 2 class hours, 2 2-hour laboratories. Credit. 3. Miss Hawes.

42. (II) Fashion in Retailing and Business

A study of the retailing and professional opportunities associated with clothing, textiles, home furnishings and related merchandise. Analysis of the function of retailing, types of retail organizations and their internal organizations. Prerequisite, Economics 25. 3 class hours. Credit, 3. Miss Niederpruem.

53. (I) Advanced Clothing Construction

Principles and practices of clothing construction. Emphasis on study of patterns and problems of fitting. Opportunities for students to create original designs. Prerequisite, TCRA 28. 2 class hours, 1 3-hour laboratory. Credit, 3. Mrs. Jarvesoo.

65. (I) Apparel Selection and Design

A comprehensive study of the development of individual expression and the attainment of satisfactions in men's, women's and children's apparel through an understanding and adaptation of basic knowledge of selection and design. Prerequisites, TCRA 23 or permission of instructor, Psychology 1 or Sociology 25. 3 class hours. Credit, 3. Miss Hawes.

66. (II) Apparel and Home Furnishings Accessories

Materials, manufacturing processes, resources and markets of apparel and home furnishing accessories. Quality differences and essential selling information in ceramics, glassware, metals, jewelry, leathers, furs, plastics and furniture. 2 class hours, 1 2-hour laboratory. Credit, 3. Staff.

76. (II) History of Decorative Arts

A study of style periods in historic context—their aesthetic contributions. Emphasis on developments in western dress, furniture and furnishings. Illustrated lectures. Study tours. Prerequisite, TCRA 23, or by permission of instructor. 3 class hours. Credit, 3. Mrs. Jarvesoo.

78. (II) Applied Textile Design

A creative approach to textile art. Original designing which emphasizes principles of organization. Application to heighten the understanding in techniques and media. Prerequisites, TCRA 23, or Art 31, or by permission of the instructor. 1 class hour, 1 4-hour laboratory. Credit, 3. Mrs. Jarvesoo.

79. (I) Interior Design

Principles in coordinating furnishings, backgrounds, accessories, color, lighting, etc. to interior designs. Prerequisite, TCRA 23. 2 class hours, 1 2-hour laboratory. Credit, 3. Staff.

85. (I) Fashion Industries

Organization and structure of fashion industries in primary and regional markets producing ready-to-wear and apparel accessories. Factors affecting designing, production, distribution and consumption of clothing. Emphasis on the promotion process in fashion merchandising. Prerequisites, Marketing 71. 4 class hours. Credit, 4. Miss V. Davis.

86. (II) Textiles II

Concentrated study and evaluation of recent scientific and technical developments in fibers and finishes affecting appearance, performance, care and cost. Prerequisites, TCRA 24. 3 class hours. Credit, 3. Miss Hawes.

93. (I) Retailing Field Experience

A 7-8 weeks off-campus supervised and coordinated training-work program in a cooperating department store. Experience in selling supervision or merchandising followed by evaluation of training, work experience, leadership development and individual progress. Prerequisites, Marketing 71, TCRA 42, 24, 66, and 6-8 weeks selling experience; or permission of instructor. Credit, 6. (This course will be blocked in the same manner as the present student teaching course.) Miss Niederpruem.

95. (I) Seminar in Fashion in Retailing and Business

Planning, developing and executing a survey or study of special interest to the student in the areas of retail store operations or management, clothing consumption patterns, consumer clothing problems or related topics. Prerequisites, TCRA 42, Marketing 71. 3 class hours. Credit, 3. Miss Niederpruem.

97. (I) 98. (II) Problems in Fashion Retailing and Business

Credit, 1-3. Staff.

HOME ECONOMICS EDUCATION

61. (I) Communication by Demonstration Methods

The developing and selling of an idea through the medium of demonstration as applied to education and promotional work. The building of individual confidence is stressed. Prerequisites, Speech 3, 6 credits in major area or permission of instructor. 1 class hour. 2 2-hour laboratories. Credit, 3. Miss D. Davis.

63. (I) Art Activity in Recreation

Stresses creative growth of the individual. Adapted for those working in schools, playgrounds, camps, in recreational leadership and occupational therapy. Prerequisite, Psychology 1. 2 class hours, 1 2-hour laboratory. Credit, 3. Mrs. Sullivan.

81. (I) Adult Education in Home Economics

Organization of material, selection, use and evaluation of teaching techniques suited to group work with adolescents and adults. Credit toward meeting state standards for teachers and A.D.A. requirement. Prerequisite, minimum 6 credits in major area. 2 class hours, 1 2-hour laboratory. Credit, 3. Mrs. Sullivan.

82. (II) Curriculum in Home Economics

Organization, scope and sequence of learning experiences in home economics education at secondary level. Philosophy and content of curriculum, development of resource units. Prerequisites, Psychology 56 and 66, Education 51. 2 class hours, 1 2-hour laboratory. Credit, 3. Mrs. Sullivan.

95. (I) Seminar in Home Economics Education

1 class hour. Credit, 1. Mrs. Sullivan.

97. (I) 98. (II) Problems in Home Economics Education

An intensive study of some phase of home economics education. Credit, 1-3. Staff.

MANAGEMENT AND FAMILY ECONOMICS

50. (II) Family Management and Decision Making

Management and Decision-making in the Family. A presentation of the integrated nature of home management; concerns values and goals as reflected in decision-making about family resources. 3 class hours. Credit, 3. Staff.

60. (II) Household Equipment

Physical principles, construction, materials and economic considerations underlying the selection, use and care of household equipment. 2 class hours, 1 2-hour laboratory. Credit, 3. Miss Merriam.

74. (II) Consumer Attitudes and Demand

Study of the motives, attitudes and expectations of consumer behavior as influencing variables operating within and on the market. Prerequisites, Economics 25, Psychology 1, Sociology 25 or by permission of the instructor. 3 class hours. Credit, 3. Miss Merchant.

75. (I) Personal and Family Economics

Analysis of financial problems and alternatives available to individuals and families under changing conditions. Exploring aspects of financial institutions affecting people in our economic society. Prerequisite, Economics 25 or by special permission of instructor. 3 class hours. Credit, 3. Miss Merriam.

77. (I) (II) Theory and Application of Management

Theory and application of principles of effective home management. Residence provided. Problem-solving program applied to theoretical and practical situations. Prerequisites, MFE 50, FN 27 and 30 or 56. Three weeks residence (3 x 5 days) and 11 weeks of: 1 class hour, 1 2-hour laboratory. Credit, 3. Miss Merriam.

HUMAN DEVELOPMENT

70. (I) (II) Child Development

The study of the child from the developmental point of view. Planned observation and participation in the nursery school. Prerequisites, Sociology 25, Psychology 1. 3 class hours, 1 1-hour laboratory period. Credit, 3. Mrs. Myers.

80. (II) Human Development in the Family

The family as the dynamic setting for the development of the human being from conception to senescence, with consideration of roles and relationships at the various developmental stages. Prerequisites, Psychology 1 and Sociology 25. 3 class hours. Credit, 3. Mr. Burroughs.

83. (I) Nursery School Management

Principles and methods of nursery school education. Directed experience in teaching and curriculum planning for three- and four-year-old children. Field trips. Prerequisites, HD 70 or equivalent. 2 class hours, 1 3-hour laboratory. Credit, 3. Miss Weaver.

84. (II) Nursery School Management

Continuation of 83. Prerequisite, HD 83 or permission of instructor. 2 class hours, 1 3-hour laboratory. Credit, 3. Miss Weaver.

95. (I) Seminar in Human Development

Prerequisite, HD 70 or 80. 1 class hour, Credit, 1. Staff.

97. (I) 98. (II) Problems in Nursery School Education

An intensive study of some phase of Nursery School Education. By permission of staff adviser. Credit, 1-3. Staff.

HORTICULTURE

Acting Head of Department: Professor Grant B. Snyder. Professors Boicourt, Lachman, Southwick, Thomson; Assistant Professors Jester, Ross, Tuttle; Messrs. Anderson, Goddard, Maynard.

2. (II) Basic Horticulture

An introductory study of the classification, location, composition, structure, flowering, fruiting, training, pruning, environmental adaptation, nutrition, and storage of horticultural crops. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Southwick, Mr. Anderson.

27. (I) Deciduous Orchards

The scientific principles governing the establishment and maintenance of deciduous orchards. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Anderson.

28. (II) Systematic Pomology (1963-64)

The kinds and varieties of fruits; their nomenclature, classification, identification; and growth and fruiting habits as related to training. Given in alternate years. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Anderson.

29. (I) Small Fruits

A study of the principles governing the establishment and management of berry and other small-fruit plantings. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Anderson.

31. (I) Plant Propagation

The principles of plant propagation by seed and vegetative means, combined with useful techniques. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Boicourt, and Staff.

32. (II) Commercial Olericulture

A detailed study of the cultural problems involved in the commercial production of specific vegetable crops. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Maynard.

53. (I) Commercial Olericulture (1962-63)

The principles basic to vegetable farm organization, management, and cultural practices as related to the commercial production of vegetable crops. Given in alternate years. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Thomson.

54. (II) Herbaceous Plants

The identification, culture and use of annuals, biennials, perennials, bulbs, bedding plants, and roses in ornamental gardens. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Boicourt.

55. (I) Floral Arrangement

The basic principles of design as applied to commercial retail flower arrangement. For students specializing in Floriculture; others by permission of instructor. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Ross.

58. (II) Amateur Floriculture

This course stresses (1) garden flowers and their use, (2) foliage and flowering plants for indoor use and their propagation, (3) flower arrangement. For non-majors only. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Goddard.

62. (II) Plant Breeding Methods

An advanced study of genetic topics peculiar to plants, also the methods and problems of the plant breeder. Prerequisite, Zoology 53. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Lachman.

65. (I) Systematic Olericulture (1963-64)

An intensive study of the history, ontogeny, nomenclature, classification, identification, and structure of the various kinds, varieties, and strains of vegetables. Given in alternate years. 2 class hours, 4 laboratory hours. Credit, 4. Mr. Maynard.

73. (I) Produce Marketing Practices

Methods of preparing produce for market, post harvest handling, quality control, precooling, packinghouse facilities, commercial grades, packs, packages and inspection services. 3 class hours. Credit, 3. Mr. Snyder.

74. (II) Merchandizing of Perishables

Merchandising produce through wholesale and retail channels, emphasizing prepackaging, types of wholesale and retail outlets and operators, methods of sale, regulations, brands and advertising. 3 class hours. Credit, 3. Mr. Snyder.

75. (I) 76. (II) Commercial Floriculture

Cultural methods for important commercial cutflower crops and potted plants; marketing of flowers and plants; and methods of keeping records and cost analysis. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Jester.

95. (I) Seminar

For all seniors specializing in the areas of floriculture, olericulture, and pomology. 1 class hour. Credit, 1. Mr. Southwick.

97. (I) 98. (II) Special Problems in Horticulture

Advanced study of special topics, research literature review, and original investigations in the area of the student's specialization. 1 class hour, 4 laboratory hours. Credit, 3. Staff.

JOURNALISM

PROFESSOR MUSGRAVE

51. (I) Introduction to Mass Communication

Problems of communication media, including the communications revolution, freedom of the press, the communication process, methods of reporting and writing, communication theory and research. 3 class hours. Credit, 3. Mr. Musgrave.

52. (II) Language and Mass Communication

Analysis of major approaches to language problems as they relate to mass communication media and the student's skill in communication. 3 class hours. Credit, 3. Mr. Musgrave.

62. (II) Article Writing

A study of magazine journalism combined with instruction in the writing of feature or magazine articles. 3 class hours. Credit, 3. Mr. Musgrave.

95. (I) Seminar

Writing for publication and training in copy editing. University student publications and town newspapers are used as laboratories. 2 class hours, 1 laboratory period. Credit, 3. Mr. Musgrave.

96. (II) Freedom of the Press

Seminar in freedom of the press: (1) its history, (2) major theories, (3) key cases in Anglo-American law, and (4) recent trends toward its redefinition. 3 class hours. Credit, 3. Mr. Musgrave.

LANDSCAPE ARCHITECTURE

Head of Department: PROFESSOR RAYMOND H. OTTO. ASSOCIATE PROFESSORS BACON, PROCOPIO; ASSISTANT PROFESSORS CAVEN, HAMILTON, KENT; VISITING LECTURER KANTIANIS.

2. (II) Landscape Drafting

The mechanical aspects of the designer-draftsman, including the simple projections—orthographic, perspective, and isometric. 3 2-hour laboratory periods. Credit, 3. Mr. Procopio.

23. (I) Survey of Landscape Architecture

The history and literature of landscape architecture and allied fields, including an examination of traditional styles of gardens. 3 class hours. Credit, 3. Mr. Otto.

24. (II) Topography and Construction

Contour interpolation, grading and drainage, drive design, profiles and sections, computation of earthwork. Application of surveying to landscape construction. Prerequisites, Civil Engineering 27; Landscape Architecture 2. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Hamilton.

25. (I) Graphics

Special techniques and symbols for landscape plans, sections and pictorial elevations, and the use of perspective charts and color in various media. 2 3-hour laboratory periods. Credit, 3 Mr. Kent.

28. (II) Basic Design

The elements and principles of design, the analysis of composition, and the application in design of forms and motifs, drawn from nature. Prerequisites, Landscape Architecture 2 and 23 or permission of instructor. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Otto.

30. (II) Plant Materials

Detailed study of deciduous and evergreen trees, with special reference to mature form and character, means of identification, natural associations, and uses in landscape work. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hamilton.

53. (I) Applied Design

A series of problems in the design of small home grounds and larger private properties. Prerequisites, Landscape Architecture 2, 28. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Kent.

54. (II) Intermediate Design

Special problems in site planning for semi-public and public works, institution grounds, etc. A field trip is required, costing approximately $40.00. Prerequisites, Landscape Architecture 24, 53. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Kent.

55. (I) Construction Details

A series of problems in architectural garden features as walks, steps, walls. fences, pools and small structures. Prerequisite, Landscape Architecture 24. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Procopio.

59. (I) Plant Materials

Detailed study of shrubs and woody vines, and their identification, with special emphasis given to their adaptability to landscape uses, methods of handling, and care. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Hamilton.

67. (I) Architecture

Architectural development, including styles and forms in architecture, especially as affected by materials and methods of construction. 3 class hours. Credit, 3. Mr. Kantianis.

68. (II) Architectural Design

The relations between exterior and interior spaces and structures as a primary element in design and construction. A series of problems integrating theory, design analysis, and graphics. Prerequisite, Landscape Architecture 67. 1 class hour, 2 3-hour laboratory periods. Credit, 4. Mr. Kantianis.

71. (I) Planting Design

The utilization of plant materials in combination as applied to the many conditions and demands of landscape work. Prerequisites, Landscape Architecture 30, 59. 2 3-hour laboratory periods. Credit, 3. Mr. Caven.

73. (I) 74. (II) City Planning

The historical and legal aspects of land use and regional development, and a critical examination of planning techniques used in guiding the physical growth of communities. 3 class hours. Credit, 3. Mr. Bacon.

75. (I) 76. (II) Projects in Planning

An application of the principles of modern civic development through a series of problems on the design of various types of urban land areas. Prerequisites, Landscape Architecture 73, 74, or permission of instructor. 3 2-hour laboratory periods. Credit, 3.

77. (I) 78. (II) Urban Problems

Housing, industrial location and development, decentralization, arterial systems, civic and metropolitan design, and regional planning. Open to non-majors. Prerequisites, Landscape Architecture 73, 74, or permission of the instructor. 3 class hours. Credit, 3. Mr. Bacon.

81. (I) 82. (II) Advanced Design

Exchange problems plus specialized landscape details and a summary of design. A field trip is required, costing approximately $40.00. Prerequisites, Landscape Architecture 53, 54. 1 class hour, 3 2-hour laboratory periods. Credit, 4. Mr. Procopio.

84. (II) Presentation

Preparation and rendering of landscape and architectural plans, elevations, perspectives, etc. 2 2-hour laboratory periods. Credit, 2. Mr. Kantianis.

96. (II) Professional Practice

A seminar on the methods and procedures of the professional office. Prerequisite, Landscape Architecture 81, or permission of instructor. 1 class hour. Credit, 1. Mr. Otto.

MATHEMATICS

Head of Department: Professor Allen E. Anderson, Professor Wagner; Associate Professors Archer*, Azpeitia, Boutelle, Cullen, Dickinson*; Assistant Professors Allen, Barr, Brown, Dormont, Kertzner, Killam, Lavallee, McHaffey*, Norvig, Riley, Stockton; Mrs. Cook, Mrs. Epstein, Miss Naylor, Mrs. Ratay, Mrs. Rice, Messrs. Bunuel, Bussel, Halm, Kennedy, Mento, Simonoff; Departmental Fellows Edwards, Melikan, Whitson; Teaching Associates Dudman, Hebert, Parent, Purinton, Thuraisamy, Wright; and Teaching Fellow Christianson.

01. (I) Elementary College Algebra

Intended for those students who offer only one unit of algebra for entrance. A review of elementary algebra and a more thorough study of such topics as quadratic equations, exponents and radicals, and progressions. No college credit is given for this course. 3 class hours. Credit, 0.

* On Leave of Absence.

1. (I) (II) Introductory Mathematics I

Basic set-theoretic and axiomatic concepts, number systems and equations. A study of elementary functions, algebraically and by the methods of analytic geometry. 3 class hours. Credit, 3.

2. (I) (II) Introductory Mathematics II

A terminal course intended for students whose curriculum calls for just one year of mathematics. A continuation of Mathematics 1, including topics from the calculus, statistics, and mathematics of finance. Prerequisite, Mathematics 1. 3 class hours. Credit, 3.

4. (I) (II) Introductory Mathematics IV

A continuation of Mathematics 1 for those students intending to take further courses in mathematics. Trigonometry, Introduction to analytic geometry and calculus. Prerequisite, Mathematics 1. 3 class hours. Credit, 3.

5. (I) (II) Introductory Engineering Mathematics

Introduction to analytic geometry and calculus. 4 class hours. Credit, 4.

6. (I) (II) Introductory Calculus for Engineering

Continuation of Mathematics 5. Prerequisite, Mathematics 5. 4 class hours. Credit, 4.

7. (I) (II) Algebra and Trigonometry

For freshmen Engineers who are deficient in trigonometry and for Landscape Architecture majors. Fractions, quadratic equations, exponents, logarithms, variation, determinants of the second and third orders, and plane trigonometry. 3 class hours. Credit, 3.

12. (I) (II) Functional Mathematics

For freshmen in home economics, nursing, and physical education. Fractions, percentage, linear and quadratic equations with applications, exponents, logarithms, slide rule, proportion, graphs, statistics, progressions, and the elements of mathematics of investments. 3 class hours. Credit, 3.

29. (I) (II) Calculus

Further basic ideas and methods of analytic geometry and calculus. Prerequisite, Mathematics 4. 3 class hours. Credit, 3.

30. (I) (II) Calculus

A continuation of Mathematics 29 with special emphasis on applications. Prerequisite, Mathematics 29. 3 class hours. Credit, 3.

31. (I) (II) Applied Calculus for Engineers

Parametric equations, vectors, determinants, partial differentiation, multiple integrals. Prerequisite, Mathematics 6. 4 class hours. Credit, 4.

32. (I) (II) Applied Calculus for Engineers

Infinite series, expansion of functions, hyperbolic functions, differential equations. Prerequisite, Mathematics 31. 4 class hours. Credit, 4.

51. (I) Modern Euclidean Geometry

Axiomatic foundations of Euclidean and related geometries of various dimensions; extension of high school geometry. Prerequisite, Mathematics 30. 3 class hours. Credit, 3.

52. (I) (II) Introduction to Vector Spaces and Groups

The last two-thirds of Mathematics 54. Finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants. Prerequisite, Mathematics 4 or permission of the department head. 3 class hours for the last two-thirds of a semester. Credit, 2.

53. (I) (II) Introduction to Modern Algebra

Basic concepts, groups, rings, the real and complex fields. Prerequisite, Mathematics 30 or 31. 3 class hours. Credit, 3.

54. (I) (II) Continuation of Mathematics 53

Polynomials, cyclic groups, finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants. Prerequisite, Mathematics 53. 3 class hours. Credit, 3.

55. (I) Mathematics of Finance

The mathematical principles of simple and compound interest, annuities, depreciation, valuation of bonds, and insurance. May not be counted for Mathematics major credit. Prerequisite, Mathematics 1, 5 or 7. 3 class hours. Credit, 3.

56. (II) Synthetic Projective Geometry

An axiomatic study (emphasizing synthetic methods and not restricted to the plane) of geometric properties invariant under projection. Prerequisite, Mathematics 30. 3 class hours. Credit, 3.

57. (I) Linear Programming and Theory of Games

Topics include sets, probability, vectors, matrices, and an introduction to linear programming and theory of games. Prerequisite, Mathematics 2 or 4. 3 class hours. Credit, 3. Total credit for Mathematics 54 and 57 is limited to 4 credit-hours because of duplication of topics.

58. (II) Introduction to Digital Computers

The basic digital computing system, introduction to Boolean Algebra, logical design of computers, programming, coding, utility programs, criteria for evaluation of computers. Prerequisite, Mathematics 30 or permission of instructor. 3 class hours. Credit, 3.

63. (I) Probability

A postulational study of probability including counting methods, random variables, moments, and the binomial, Poisson, and normal distributions. Prerequisite, Math 29, previously or concurrently. 3 class hours. Credit, 3.

64. (II) Mathematical Statistics

Estimation of parameters, testing hypotheses, use of the chi-squared, t-, F-, and other distributions. Prerequisite, Math 63, 3 class hours. Credit, 3.

66. (II) Analytic Projective Geometry

A study, by means of coordinate systems and the methods of abstract algebra, of geometric properties invariant under projection. Prerequisite, Mathematics 54. 3 class hours. Credit, 3.

68. (I) Linear Algebra

Row equivalence. Linear transformations and matrices. Similarity Invariant subspaces, canonical forms. Inner product spaces, linear functionals, the spectral theorem. Bilinear forms. Prerequisite, Mathematics 54 or 52. 3 class hours. Credit, 3.

69. (II) Theory of Groups and Group Representations

Axioms systems, Lagrange theorem, generators, relations. Conjugate classes, normal subgroups, quotient groups. Sylow theorems. Abelian groups. Unitary and irreducible representations. Characters, orthogonality relations. Prerequisite, Mathematics 68. 3 class hours. Credit, 3.

71. (I) Vector Analysis

The Algebra and Calculus of vectors. Applications to Physics and other fields will be considered. Prerequisite, Physics 4 or 6; Corequisite, Mathematics 31 or 91. 3 class hours. Credit, 3.

74. (II) Theory of Numbers

Euclid's Algorism, theory of prime numbers, aliquot parts, congruences, further topics in number theory. Prerequisite, Mathematics 53. 3 class hours. Credit, 3.

75. (I) Survey of Advanced Mathematics for Engineers

Series solution of differential equations, functions of several variables, partial differential equations, numerical analysis and the Laplace transform. Not available for majors in Mathematics. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

76. (I) Survey of Advanced Mathematics for Engineers

Vectors and vector spaces, vector field theory, complex analysis. Not available for majors in Mathematics. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

81. (I) Complex Analysis

The Algebra of complex numbers, the elementary functions and their mappings, differentiation, integration, Taylors series, and residues. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

83. (I) Numerical Analysis

Approximation and error evaluation; finite differences; approximation by polynomials using finite difference methods and minimal criteria; special reference to sets of orthogonal polynomials. Prerequisite, Mathematics 32 or 91. 3 class hours. Credit, 3.

84. (II) Numerical Analysis

Evaluation of definite integrals; solution of differential equations, polynomial equations, other conditional equations, and systems of linear equations with related matrix manipulations. Prerequisites, Mathematics 83, 92 or 32. 3 class hours. Credit, 3.

91. Intermediate Calculus

Series, expansion of functions, partial differentiation, and multiple integrals. Prerequisite, Mathematics 30. 3 class hours. Credit, 3.

92. Differential Equations

Prerequisite, Mathematics 91. 3 class hours. Credit, 3.

93. (I) Fourier Series and Orthogonal Functions

Solutions of boundary value problems by Fourier series, Bessel functions, Legendre polynomials; convergence of representations by orthogonal functions. Prerequisite, Mathematics 92 or 32. 3 class hours. Credit, 3.

94. (II) Theoretical Advanced Calculus

Completeness properties of the set of real numbers; continuity, derivatives, and integrals of functions of one and several variables; mean value theorems. Prerequisites, Mathematics 92 or 32, and permission of the department. 3 class hours. Credit, 3.

97. (I) 98. (II) Advanced Topics

Several topics intended for individuals or small groups of students. Admission by permission of the Head of the Department. Credit, 1, 2, or 3 each semester.

MICROBIOLOGY

Associate Professor Garvey, Assistant Professor Czarnecki, Assistant Professor Larkin, Assistant Professor Mandel.

31. (I) and (II) Introductory Microbiology

An introduction to the bacteria and sub-microscopic organisms, their place in the general field of biology, and their importance in world industry, economics and health. 2 class hours, 2 2-hour laboratory periods. Credit, 4. Mr. Czarnecki, Mr. Larkin.

51. (I) Advanced Microbiology I

The general biological properties of microbes. Prerequisite, Microbiology 31. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Mandel.

52. (II) Advanced Microbiology II

A continuation of Microbiology 51 with emphasis placed on pathogenic microorganisms. Prerequisite, Microbiology 51. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Mandel.

82. (II) Quantitative and Qualitative Microbiology

The principles and practices of estimating the types, numbers and activities of microorganisms in selected environments. Prerequisite, Microbiology 51. 2 class hours, 2 2-hour laboratory periods. Credit, 3. The Staff.

85. (I) Immunology and Serology

Consideration of host reactions in prevention and cure of disease; use of biological products in differential microbiology, disease diagnosis and determination of blood groups. Prerequisite, Microbiology 52 and permission of instructor. 1 class hour, 1 4-hour laboratory period. Credit, 3.

86. (II) Virology

The nature and properties of the animal, plant and bacterial viruses. Prerequisite, permission of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3.

94. (II) Microbial Physiology

Growth and activities of microorganisms in respect to environmental factors and genotype. Kinetics of population growth, enzymatic constitution, intermediary metabolism, and effects of radiation. Prerequisites, Microbiology 31; Chemistry 79 or equivalent, and permission of the instructor. 2 class hours, 1 4-hour laboratory period. Credit, 3. Mr. Mandel.

97. (I) 98. (II) Problems

Qualified seniors who have obtained permission from the department may arrange for independent work on special problems in microbiology. Credit, 3.

MILITARY SCIENCE

Head of Department: Professor (Lieutenant Colonel) Albert W. Aykroyd. Assistant Professors (Major) Huff, (Major) Sacra, (Captain) Huggins, (Captain) Lesley, (Captain) Murray, (Captain) Williams, (Captain) Wilson.

11. (I) (II)

Organization of the Army; individual weapons; basic map reading; and leadership drill, and the exercise of command. 3 scheduled hours plus leadership laboratory. Credit, 1.

12. (I) (II)

Theoretical and practical instruction in basic tactics and techniques; the United States Army and National Security; leadership, drill, and the exercise of command. 3 scheduled hours plus leadership laboratory. Credit, 1.

25. (I) (II)

Theoretical and practical instruction in advanced map and aerial photograph reading; basic tactics and techniques and leadership, drill, and the exercise of command. 3 scheduled hours plus leadership laboratory. Credit, 1.

26. (I) (II)

American military history from the colonial wars to the present; leadership, drill, and the exercise of command. 3 scheduled hours plus leadership laboratory. Credit, 1.

51. (I) 52. (II)

Organization of Armor, tank driving, maintenance, military teaching methods; radio communications; tank gunnery; tactics and troop-leading procedures; leadership, drill and the exercise of command. 4 scheduled hours. Credit, 2.

75. (I) 76. (II)

The United States in World Affairs; military administration, law, boards, training management, advanced tactics, operations, estimates, and orders; intelligence; marches; leadership, drill and the exercise of command. 4 scheduled hours. Credit, 2.

97. (I) 98. (II)

Problems in military science for qualified advanced Armor ROTC students. Independent work on special problems or pertinent intensive studies in military science. Enrollment by arrangement with the Professor of Military Science. Total credit may not exceed 2. Credit, 1 or 2.

AIR SCIENCE

Head of Department: Professor (Colonel) John C. Marchant. Assistant Professors (Captain) Costantino, (Captain) Killion.

11. (I) Leadership Laboratory

A formalized phase of leadership training designed to provide experiences in the application of leadership principles through drill, group discussion, panels, and other suitable media. 2 laboratory hours. Credit, 1. Not quality point credit.

12. (II) Foundations of Air Power I

An introduction to the fundamentals of Air Power, including basic aeronautical science and the organization and operation of the military arm of the Federal Government. 2 class hours; 1 laboratory hour. Credit, 1.

25. (I) Foundations of Air Power II

A more advanced consideration of Air Power with emphasis on the basic concepts governing the employment of air forces, including operations in space Prerequisites, Air Science 11, 12 or Military Science 11, 12 and permission of department. 2 class hours; 1 laboratory hour. Credit, 1.

26. (II) Leadership Laboratory

A continuation of Air Science 11. 2 laboratory hours. Credit, 1. Not quality point credit.

51. (I) The Military Justice System

A study of the system by which military justice is administered; the relationship between military and civil law. Prerequisites, Air Science 25, 26 or Military Science 25, 26 and permission of department. 1 class hour; 1 laboratory hour. Credit, 1.

52. (II) Staff Organization and Military Management

A study of staff organization and functions, and the application of management principles in the USAF. 2 class hours; 1 laboratory hour. Credit, 1.

76. (II) The Air Force Officer

A study of Air Force administrative procedures; the responsibilities and obligations of the Air Force officer; and rules of conduct of the armed services. 1 class hour; 1 laboratory hour. Credit, 1.

77. (I) Principles and Problems of Military Leadership

Principles and techniques of leadership and management in the armed forces, with emphasis on the USAF. Prerequisites, Air Science 51, 52. 1 class hour; 1 laboratory hour. Credit, 1.

MUSIC

Head of Department: Professor Doric Alviani. Professor King; Assistant Professor Contino; Mr. Schwartz.

1. (I) (II) Music Appreciation—Introduction to Music

Open to all students not majoring in music. Previous musical training is not required. Basic music materials, principles of design, and the cultural significance of representative works from the ninth century to the present are studied and discussed. 3 class hours. Credit, 3.

3. (I) 4. (II) Elementary Music Theory

A study of diatonic harmony, and the development of skills in sight singing, ear training, and analysis of musical forms. Prerequisite: Ability to read music, elementary skill at playing the piano, or permission of the instructor. Music 3 prerequisite to Music 4. Credit, 3.

5. (I) 6. (II) Intermediate Music Theory

Chromatic harmony, including further studies in sight singing and ear training. Counterpoint in both 16th Century and 17th Century styles. Further analysis of musical forms, including contrapuntal forms. Introduction to orchestration, and practice in writing original compositions for instrumental ensembles. Prerequisite, Music 4 or its equivalent. Music 5 prerequisite to Music 6. Credit, 3.

12. (I) (II) Applied Music—Individual Instruction.

The study of piano playing to gain proficiency in performance. This course may be repeated several times. Music majors and minors are required to complete this course or its equivalent before they are eligible for credit. Undergraduate and graduate students may register for this course. A grade will be given each semester. 7½ hours or its equivalent. Credit, 0.

13. (I) 14. (II) Applied Music—Individual Instruction

A study of literature and instrumental technique or voice production. Prerequisite, intermediate level of proficiency as determined by examination. 7½ hours or its equivalent. Credit, 1.

15. (I) 16. (II) Applied Music—Individual Instruction

Further study of literature and instrumental technique or voice production. Prerequisites, Music 13, 14. 7½ hours or its equivalent. Credit, 1.

17. (I) 18. (II) Applied Music—Individual Instruction

Advanced study of literature and instrumental technique or voice production. Prerequisites, Music 15, 16. 7½ hours or its equivalent. Credit, 1 each semester.

19. (I) 20. (II) Applied Music—Individual Instruction

Advanced study of literature and instrumental technique or voice production. Prerequisites, Music 17, 18. 7½ hours or its equivalent. Credit, 1 each semester.

21. (I) (II) 22. (I) (II) Applied Music—Instrumental Ensemble

Study and preparation for performance of compositions of instrumental music written in many styles and in various media. One credit recorded on completion of 21, 22. The sequence 21, 22 may be repeated. Credit, 1 for each two semesters. Mr. Contino.

23. (I) (II) 24. (I) (II) Applied Music—Vocal Ensemble

Preparation of various choral works to concert standard. Additional opportunities for instrumental accompanists and vocal soloists. 1 credit recorded on completion of 23, 24. The sequence 23, 24 may be repeated. Music 23 prerequisite to Music 24. Admission only by permission of instructor. Credit, 1 for each two semesters. Mr. King.

53. (I) 54. (II) Music History—Historical Survey of Music

History and literature of music from early religious chant through 1750; and from 1750 through vocal and instrumental music of the 20th century. Prerequisite, Music 1 or 2 or permission of instructor. 3 class hours. Credit, 3.

55. (I) Music History—Music from Monteverdi to Bach and Handel

The Baroque and Rococo Periods, including the music of such composers as Monteverdi, Schutz, Frescobaldi, Lully, Purcell, Corelli, Couperin, Rameau, the Scarlattis, Bach, Handel. 3 class hours. Credit, 3.

57. (I) Music History—Gothic and Renaissance Music

Chant and organum through Renaissance motet and madrigal. Reading, listening, score study, analysis. Prerequisite, Music 53 or consent of instructor. 3 class hours. Credit, 3.

59. (I) (II) Music History—Music of the 20th Century

A study of music, both European and American, written since 1900, including Stravinsky, Bartok, Hindemith, Copland, jazz, electronic music. 3 class hours. Credit, 3.

62. (II) Music History—Haydn, Mozart and Beethoven

Haydn, Mozart, Beethoven, their contemporaries, and immediate predecessors. Reading, listening, score study. 3 class hours. Credit, 3.

64. (II) Music History—Music of the 19th Century

A historical study of music in small and large forms and various media, including Lieder, chamber music, symphony, opera. Reading, listening, score study. Prerequisite, Music 1 or 2 or consent of instructor. 3 class hours. Credit, 3.

71. (I) 72. (II) Music Theory—Form, Analysis, and Composition

Analysis by score and sound, of textures and forms of various styles. Music 72 includes practice in original composition in all forms and for all media. Prerequisite, Music 6 or equivalent. Music 71 prerequisite to Music 72. 3 class hours. Credit, 3.

73. (I) 74. (II) Music Theory—Harmonic and Contrapuntal Techniques

A continuation of Music 72. Systematic study of chromatic harmony; use of various contrapuntal procedures. Some study of 20th Century styles and opportunities for free composition. Playing and score reading. Prerequisite, Music 72 or equivalent. Music 73 prerequisite to Music 74. 3 class hours. Credit, 3.

81. (I) Music Education—Basic Instrumental Music—Woodwinds

Tone production, technical dexterity, acoustical principles of the woodwind family with emphasis given to the clarinet, flute, oboe, bassoon. Literature and materials studied and evaluated. Prerequisite, Music 4, 3 class hours. Credit, 2.

82. (II) Music Education—Basic Instrumental Music—Brasswinds and Percussion

Tone production, technical dexterity, acoustical principles of the brasswind and percussion groups with emphasis given the cornet, French horn, trombone, and tuba. Literature and materials evaluated. Prerequisite, Music 4. 3 class hours. Credit, 2.

83. (I) Music Education—Basic Instrumental Music—Strings

Tone production, technical dexterity, acoustical principles of the string family with emphasis on the violin, viola, and cello. Literature and materials studied and evaluated. Prerequisite, Music 4. 3 class hours. Credit, 2.

85. (I) (II) Music Education—Music for Elementary Teachers

For the classroom teacher having little or no formal training in music. Principles of musical development with particular emphasis on classroom presentation. Rote and reading songs examined; processes of presentation evaluated. 3 class hours. Credit, 3.

87. (I) (II) Music Education—Music Curriculum

Organization and administration of the music program and curriculum in the elementary and secondary school. Observation of area schools. Admission by permission of instructor. 3 class hours. Credit, 3.

89. (I) Music Education—Score Reading and Conducting

Open and closed scores are studied, analyzed, and played at the keyboard. Basic conducting techniques are applied to the material studied. Prerequisite, Music 4. 3 class hours. Credit, 3.

90. (II) Music Education—Score Reading and Conducting

Band, orchestral, and choral scores are studied, analyzed and conducted. As scheduling permits, choral and instrumental organizations are utilized for actual conducting. Prerequisite, Music 4. 3 class hours. Credit, 3.

SCHOOL OF NURSING

Dean: Mary A. Maher. Professor MacDonald; Associate Professors DiMaggio, Gilmore, Harshberger; Assistant Professors Byrne, Crowley; Instructors Baroli, Condron, Hall.

1. (I) Introduction to Nursing

Designed to assist the individual student in her personal and professional adjustment to nursing. Includes field observation in community agencies. Enrollment limited to students of nursing. Credit, 1. Miss Crowley, Miss Macdonald.

2. (II) Fundamentals of Nursing I

A continuation of Nursing 1. Includes field observation in health agencies. Prerequisite, Nursing 1. Credit, 1. Miss Crowley, Miss Macdonald.

25. (I) Fundamentals of Nursing II

Designed to extend the student's appreciation of health needs of people, and of the health services and resources available to help individuals, families. and communities meet their health problems. Includes field practice in health agencies. Prerequisite, Nursing 2. Credit, 1. Miss Crowley, Miss Maher.

26. (II) Fundamentals of Nursing Care

An introduction to nursing care fundamentals for all patients through experience with selected patients in a general hospital. Includes a unit on the ethical, legal and group relationships and responsibilities of the student of nursing. Prerequisite, Nursing 25. 3 class hours, 1 4-hour clinical nursing laboratory period. Credit, 4. Miss Gilmore, Miss Baroli, Miss Condron, Miss Crowley, Miss MacDonald.

27. (Summer) Human Development

The development of the human being from infancy to old age with consideration of roles and relationships at the various stages of development. Includes field observation and practice in community agencies. Enrollment limited to students of nursing. Credit, 3. Miss DiMaggio and representatives of related disciplines.

51. (I) Medical and Surgical Nursing I

Through a study of major health problems of adults and clinical experience with patients in a general hospital, the student learns to minister total nursing care. Prerequisite, Nursing 26. 12 class hours, 18 clinical nursing laboratory hours. Credit, 16. Miss Gilmore, Miss Baroli, Miss Condron, Miss Crowley, Miss Macdonald, Medical and Allied Professional Staffs of the Springfield Hospital and other Health Agencies.

54. (I) (II) Psychiatric Nursing

A study of the care of psychiatric patients with emphasis on the role of the nurse in treatment and prevention of mental illness in both the home and hospital. Concepts from the fields of psychiatry, psychology and sociology are integrated with those of psychiatric nursing. Taught concurrently with Public Health Nursing. Prerequisite, Nursing 51. 6 class hours, 8 clinical nursing laboratory hours. Credit, 8. Miss Hall, Psychiatric and Allied Professional Staffs of the Cooperating Hospitals and Agencies.

57. (I) (II) Maternal and Child Nursing

The first unit of the course is developed around the responsibilities of marriage and family living.

The second unit, concerned with the meaning of pregnancy to the mother, baby and family, provides an opportunity for planning and ministering nursing care throughout the maternity cycle.

In the third unit of the course, a developmental approach in studying the health needs of children is utilized and clinical experience in caring for sick children is provided. Prerequisite, Nursing 51. 12 class hours, 16 clinical nursing laboratory hours. Credit, 16. Miss DiMaggio, Miss Harshberger, Miss Crowley, Obstetrical, Pediatric and Allied Professional Staffs of Wesson Maternity Hospital, Springfield Hospital and other Health and Community Agencies.

58. (I) (II) Public Health Nursing

The philosophy, scope and purpose of public health and public health nursing. Principles and practices of public health nursing are taught concurrently with selected experiences in an official and non-official public health nursing service and with Psychiatric Nursing. Prerequisites, Nursing 51, 57. 6 class hours, 12 public health nursing practice hours. Credit, 8. Miss Byrne, Mr. Wisnieski, Professional Staffs of Visiting Nurse Association of Springfield, Springfield Health Department and other Health Agencies.

60. (II) Medical and Surgical Nursing II

A continuation of Nursing 51. Through study and clinical experience with patients with multiple health problems in a general hospital, the student learns to minister comprehensive nursing care. Separate sections for junior and senior students. Prerequisite, Nursing 51. 12 class hours, 18 clinical nursing laboratory hours. Credit, 16. Miss Gilmore, Miss Baroli, Miss Condron, Miss Crowley, Medical and Allied Professional Staffs of the Springfield Hospital and other Health Agencies.

95. (I) Senior Nursing Seminar

A seminar on professional, social and historical foundations of nursing. Includes introductory unit on role and process of research in nursing. Enrollment limited to senior students of nursing. 3 class hours. Credit, 3. Miss MacDonald.

96. (II) Senior Nursing Seminar

A seminar in which the principles of management as applied to the nursing care of patients are studied. Emphasizes the role of research in nursing service administration. Prerequisite, Nursing 95. Credit, 3. Miss Baroli, Miss Macdonald.

PHYSICAL EDUCATION FOR MEN

Head of Department: Professor S. W. Kauffman, Professor Briggs; Associate Professors Bischoff, Garber, Ricci; Assistant Professors Cobb, James; Messrs. Bergquist, Brosky, Douglas, Pencek.

Enrollment by non-majors in Skills and Techniques courses, only by permission of the instructor.

1, 2. (I) 3, 4. (II) Physical Education

Aim of the course is to inculcate in the student an adequate knowledge of, a sufficient technique in, and a wholesome attitude toward physical education activities through the medium of individual, dual, and team sports. 3 class hours. Credit, 2. Not quality point credit.

5. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) lacrosse. (Unit 2) apparatus gymnastics. 60 clock hours per semester. Credit, 1.

6. (II) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) tumbling and trampoling. (Unit 2) badminton. 60 clock hours per semester. Credit, 1.

21. (I) Introduction to Physical Education

Origins of physical education, fundamental concepts, current status in education, qualifications and professional opportunities in the field. 3 class hours. Credit, 3.

22. (II) First Aid and Safety

Materials applicable to the immediate care of the injured, causes of accidents and procedures designed to develop desirable safety practices. 3 class hours. Credit, 3.

23. (I) Principles and Practices in Health Education

Principles of personal and community health, teaching techniques, materials and resources. 3 class hours. Credit, 3.

31, 32. (I) 33, 34. (II) Physical Education

A continuation of Physical Education 1, 2, 3 and 4. 3 class hours. Credit 2. Not quality point credit.

35. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) soccer. (Unit 2) wrestling. 60 clock hours per semester. Credit, 1.

36. (II) Skills and Techniques

Fundamental skills in life saving and water safety. Certification as American Red Cross Water Safety Instructor. 60 clock hours per semester. Credit, 1.

41. (I) Human Anatomy

A study of the gross structure and function of the human body. 2 class hours, 1 2-hour laboratory period. Credit, 3.

42. (II) Kinesiology

A study of the anatomical application basic to a thorough understanding of the mechanical problems in motor skills. Prerequisite, Physical Education 41. 2 class hours, 1 2-hour laboratory period. Credit, 3.

43. (I) Officiating

Techniques and practice in officiating major sports. 2 class hours. Credit, 2.

53. (I) Physical Education in Elementary and Secondary Schools

Modern materials and methods of teaching physical education in elementary and secondary schools. 3 class hours. Credit, 3.

54. (II) Methods of Physical Education

Laboratory experience in teaching individual, dual and team activities. Credit, 1.

55. (I) Organization and Administration of Physical Education

A study of the basic problems in the organization and administration of physical education. 3 class hours. Credit, 3.

57. (I) Methods and Materials: Coaching Baseball

Development of individual skills and techniques of teaching and coaching baseball. 2 class hours. Credit, 1.

58. (II) Methods and Materials: Coaching Track

Development of individual skills and techniques of teaching and coaching track. 2 class hours. Credit, 1.

59. (I) Adapted Physical Education

Programs of developmental activities, suited to the interests and capacities of students with disabilities restricted from participation in activities of the general physical education program. Prerequisite, Physical Education 42. 3 class hours. Credit, 3.

60. (II) Methods and Materials: Coaching Football

Development of individual skills and techniques of teaching and coaching football. 2 class hours. Credit, 1.

61. (I) Methods and Materials: Coaching Basketball

Development of individual skills and techniques of teeaching and coaching basketball. 2 class hours. Credit, 1.

62. (II) Methods and Materials: Coaching Soccer

Development of individual skills and techniques of teaching and coaching soccer. 2 class hours. Credit, 1.

63. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) baseball. (Unit 2) basketball. 60 clock hours per semester. Credit, 1.

64. (II) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) high and low organization games. (Unit 2) track and field. 60 clock hours per semester. Credit, 1.

74. (II) Tests and Measurements

The statistical interpretation of data and the practical application of measurement to physical education. 3 class hours. Credit, 3.

75. (I) Athletic Injuries—Prevention and Care

The medical examination, techniques in support methods, therapeutic aids, clinical use of physiotherapy equipment. Prerequisite, Physical Education 42. 2 class hours, 1 2-hour laboratory period. Credit, 2.

76. (II) Philosophy and Principles of Physical Education

Contemporary interpretations and critical analysis for the foundation of policies and program construction. 3 class hours. Credit, 3.

78. (II) Physiology of Exercise

Application of basic physiological concepts to the program of physical education, emphasizing the physiological effects and adjustments accruing from participation in physical activity. Prerequisite, Physical Education 42. 2 class hours, 1 2-hour laboratory period. Credit, 3.

80. (I) and (II) Driver Education Instructor Course

Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training. 2 class hours, 1 2-hour laboratory period. Credit, 3.

81. (I) Administration of Intramural Programs

Objectives, tourney design, organization and administration of intramural programs. 2 class hours. Credit, 1.

83. (I) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1) volleyball. (Unit 2) tennis. (Unit 3) archery. 60 clock hours per semester. Credit, 1.

84. (II) Skills and Techniques

Fundamental skills and techniques of teaching. (Unit 1 dance. (Unit 2) golf. 60 clock hours per semester. Credit, 1.

97. (I) 98. (II) Special Problems Course

Presentation and discussion of research work in physical education, health, or athletics. 3 class hours. Credit, 3.

PHYSICAL EDUCATION FOR WOMEN

Head of Department: Professor Ruth J. Totman. Associate Professors Hubbard, Riggs; Assistant Professors Ogilvie, Reid, Vendien, Wallace; Misses Pratt, Roby, Rupp, Wooliams.

1. (I) Introduction to Physical Education for Women

A brief survey of the various areas of physical education for all ages; the trends and opportunities in today's program. 2 class hours, 1 2-hour laboratory period. Credit, 2. Miss Totman.

2. (II) Introduction to the Child through Physical Education

A study of children as they take part in physical activities. 2 class hours, 1 2-hour laboratory period. Credit, 2. Miss Riggs.

5. (I) Physical Education

Students are required to pass a safety test in swimming. Except for this requirement all unrestricted students may select any activity which is offered. Fall season: archery, field hockey, folk dance, golf, lacrosse, life-saving, modern dance, swimming, synchronized swimming, tennis, volleyball. 3 class hours. Credit, 1. Not quality point credit.

6. (II) Physical Education

Winter II season: same as in Course 7. 3 class hours. Credit, 1. Not quality point credit.

7. (I) Physical Education

Winter I season: badminton, ballroom dance, basketball, body mechanics, bowling, diving, fencing, folk dance, gymnastics, life-saving, modern dance, swimming, synchronized swimming, tap dance, trampoline, volleyball. 3 class hours. Credit, 1. Not quality point credit.

8. (II) Physical Education

Spring season: archery, folk dance, golf, lacrosse, life-saving, modern dance, softball, swimming, synchronized swimming, tennis, volleyball. 3 class hours. Credit, 1. Not quality point credit.

10. (II) Health for Adults

Practical personal and community health problems for the consideration of young adults. 2 class hours. Credit, 2. Miss Vendien.

11. (I) Skills

Field hockey, tennis; gymnastics, swimming. 6 class hours. Credit, 1.

12. (II) Skills

Folk dance, basketball; golf, softball. 6 class hours. Credit, 1.

25, 27. (I) 26, 28. (II) Physical Education

The seasonal activities for sophomores are the same as in Courses 5, 7, 6, and 8. The emphasis on perfecting techniques rather than learning the elementary skills. 3 class hours. Credit, 2 per semester. Not quality point credit.

30. (II) Aquatics

Techniques unique in the teaching of aquatics including the American Red Cross courses. 2 class hours, 1 2-hour laboratory period. Credit, 2. Miss Wallace.

31. (I) Skills

Archery, swimming; basketball officiating, dance. 6 class hours. Credit, 1.

32. (II) Skills

Dance, gymnastics; lacrosse, volleyball. 6 class hours. Credit, 1.

51. (I) Skills and Teaching Techniques

Soccer, speedball, hockey; tap dance, basketball. The chief emphasis will be on teaching techniques; however, improvement in skill will be stressed. 6 class hours. Credit, 2.

52. (II) Skills and Teaching Techniques

Gymnastics, ballroom dance; tennis, body mechanics. 6 class hours. Credit, 2.

53. Physical Education for Elementary Schools

Modern methods and material for teaching physical education in elementary grades. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Riggs.

56. (II) Methods and Principles of Health Education for Elementary and Secondary Schools

To prepare students to teach health and hygiene in elementary and secondary schools. 3 class hours. Credit, 3. Miss Totman.

PHYSICAL RECREATION

61. (I) Skills and Teaching Techniques

Fencing, folk dance, badminton. 6 class hours. Credit, 2.

62. (II) Skills and Teaching Techniques

Dance, bowling; lacrosse. 6 class hours. Credit, 2.

63. (I) Analysis of Rhythm

The analysis of the rhythmic structure of music and its applications to motor activity. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Roby.

70. (II) Organization and Administration

The organization of the school system, the role of the teacher, the necessary facilities and the program in physical education. 3 class hours. Credit, 3. Miss Ogilvie.

73. (I) History and Principles of Physical Education

A study of the principal methods of physical education throughout the western world and of the philosophical and scientific bases of learning and teaching as applied to physical education. 3 class hours. Credit, 3. Miss Ogilvie.

83. (I) Adaptive Physical Education for Women

The problems of exercise for girls who are restricted physically. 3 class hours. Credit, 3. Miss Hubbard.

96. (II) Seminar

The opportunity for specialized study in a chosen area of physical education with emphasis on practical application. 3 class hours. Credit, 3. Miss Ogilvie.

PHYSICAL RECREATION

The following courses, taught jointly by the departments of Physical Education for men and Physical Education for women, are offered for majors in Recreation Leadership. Non-major admission is only by permission of the Department.

13. (I) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in badminton and basketball. 60 clock hours. Credit, 1.

14. (II) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in games and archery. 60 clock hours. Credit, 1.

39. (I) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in tennis and minor recreational sports. 60 clock hours. Credit, 1.

67. (I) 68. (II) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in winter sports and the various dance forms including ethnic, social and modern. 60 clock hours. Credit, 1.

PHYSICS

Head of Department: Professor John D. Trimmer. Professors Rosen, Ross; Associate Professors Lewis, Steinberg; Assistant Professors Foland, Jones, Mathieson, Putnam; Messrs. Bangs, Crooker, Hsu.

3. (I) 4. (II) Introductory Physics

Mechanics, sound, heat; electricity, magnetism, light and modern physics, using trigonometry and algebra, but not calculus. Intended for premedical, predental, preveterinary, and some science major students. Prerequisites, Mathematics 4 previously or concurrently for Physics 3; Physics 3 for Physics 4. 3 class hours, 1 2-hour laboratory period. Credit, 4.

5. (I) General Physics

Mechanics. For students primarily interested in physics, engineering, chemistry, or mathematics, who, in general, have had high school physics. Prerequisite, Mathematics 5 previously or concurrently. 2 class hours, 1 2-hour laboratory period. Credit, 3.

6. (II) General Physics

Heat, electricity, and magnetism. Prerequisites, Mathematics 5; Physics 5; Mathematics 6 concurrently. 2 class hours, 1 2-hour laboratory period. Credit, 3.

7. (I) (II) General Physics

Electromagnetic radiation, atomic and nuclear physics. Prerequisites, Mathematics 6; Physics 6. 3 class hours, 1 2-hour laboratory period. Credit, 4.

8. (II) 9. (I) Advanced Introductory Physics for Physics Majors

A limited-enrollment course for Physics majors or others interested in an introductory course at an advanced level. Prerequisites, Mathematics 4 or 5 or 29, and consent of Physics Department. 3 class hours, 1 2-hour laboratory period. Credit, 4.

51. (I) 52. (II) Electricity and Magnetism

The basic phenomena and laws of electricity and magnetism. Measurement, with an introduction to circuitry and electronics. Prerequisites, Physics 4, and Mathematics 30 or 31 for Course 51; Course 51 for Course 52. 2 class hours, 1 2-hour laboratory period. Credit, 3.

54. (II) Meteorology

Theoretical treatment of various atmospheric phenomena, with correlation of observation and theory. Weather observations, preparation of weather charts, and weather forecasting. Prerequisites, Physics 4 or 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

55. (I) 56. (II) Mechanics

Development of the fundamental concepts of dynamics with applications to particles and rigid bodies in translation and rotation. Prerequisites, Physics 4 or 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

60. (II) Sound and Acoustics

Vibrations, coupled systems, sound structure, and acoustic properties; principles and applications. Prerequisites, Physics 4 or 7; Mathematics 30 or 31. 3 class hours. Credit, 3.

61. (II) Heat and Thermodynamics

Heat exchanges and related energy changes in systems of matter. Prerequisites, Physics 4 or 6; Mathematics 30 or 31. 3 class hours. Credit, 3.

63. (II) Optics

An intermediate course in geometrical and physical optics. Prerequisites, Physics 4 or 7; Mathematics 30 or 31. 2 class hours, 1 2-hour laboratory period. Credit, 3.

66. (I) Kinetic Theory

Classical kinetic theory of gases, with an introduction to phenomena in the non-uniform gas. Prerequisite, Physics 55. 3 class hours. Credit, 3.

67. (II) Statistical Mechanics and Information Theory

A study of the concepts of entropy, information, and order. Prerequisite, Physics 61. 3 class hours. Credit, 3.

85. (I) 86. (II) Modern Physics

Twentieth-century physics, the first semester devoted principally to atomic aspects, the second to nuclear. Prerequisites, Physics 52 and six other credits in junior-senior physics. 3 class hours. Credit, 3.

88. (II) Solid State Physics

An introduction to theoretical and experimental physics of the solid state. Prerequisite, permission of the instructor. 3 class hours. Credit, 3.

91. (II) Gaseous Electronics

Electrical conduction in gases, interactions of space charge and electromagnetic waves, plasmas. Prerequisite, Physics 52. 3 class hours. Credit, 3.

97. (I) 98. (II) Advanced Experimental Work

Selected experiments and projects are investigated, according to the needs of the individual student. Prerequisites, Physics 51 or 55. 3 2-hour laboratory periods. Credit, 1 to 3.

PHILOSOPHY

Head of Department: Professor Clarence Shute, Professor Oppenheim (Government), Assistant Professors Ehrlich, Swanson; Mr. Clay.

For an introduction to the field as a whole, freshman-sophomore students are advised to elect Philosophy 25, junior-senior students, Philosophy 51 and/or 52.

25. (I) and (II) Introduction to Philosophy

An introduction to some of the most important of the general questions, ideas, theories and methods of inquiry which have given direction to Western thought. 3 class hours. Credit, 3. Messrs. Clay, Ehrlich.

31. (I) and (II) Introduction to Logic and Scientific Method

An inquiry into the nature of critical thinking, including (1) the functions of language, (2) the structure of deductive arguments, (3) a glimpse at inductive methods. 3 class hours. Credit, 3. Messrs. Swanson, Clay.

42. (I) and (II) Ethics

An examination of classical and contemporary theories concerning policy formation and the justification of personal decision and ways of life. 3 class hours. Credit, 3. Mr. Clay.

51. (I) History of Philosophy—Ancient and Medieval

The development of Western thought from its earliest beginnings to the flowering of medieval scholasticism. Emphasis on the contribution of important movements and great thinkers. 3 class hours. Credit, 3. Mr. Shute.

52. (II) History of Philosophy—Modern

Continuation of Philosophy 51 from the Renaissance and the rise of modern science to 19th century idealism, positivism and voluntarism. 3 class hours. Credit, 3. Mr. Shute.

53. (I) The Philosophy of Plato (1963-64)

A study of the later dialogues for their analysis and resolution of major philosophical problems and for their influence on contemporary thought. Given in alternate years. Prerequisite, Philosophy 25 or 51. 3 class hours. Credit, 3. Mr. Ehrlich.

55. (I) The Philosophy of Aristotle (1962-63)

Selections from the works of Aristotle are studied for an understanding of their systematic analysis and theory in the major fields of philosophy. Given in alternate years. Prerequisite, Philosophy 25 or 51. 3 class hours. Credit, 3. Mr. Shute.

58. (II) Philosophy in the Age of Enlightenment (1962-63)

A study of texts by representative thinkers from Descartes and Locke to Kant. The relation of these thinkers to modern science and contemporary thought. Given in alternate years. Prerequisite, Philosophy 25 and permission of instructor, or 52. 3 class hours. Credit, 3. Mr. Ehrlich.

61. (I) Contemporary Philosophies

A survey of the diverse philosophical directions representing the intense activity of contemporary American and European thinking. Prerequisite, Philosophy 25 and permission of instructor, or 52, or 58. 3 class hours. Credit, 3. Mr. Ehrlich.

64. (II) Existential Philosophies (1963-64)

Examination by means of a study of selected original texts, of the main problems peculiar to this movement as a whole and to its main exponents individually. Given in alternate years. Prerequisites, Philosophy 25 and permission of instructor, or 51 or 52. 3 class hours. Credit, 3. Mr. Ehrlich.

67. (I) American Philosophy

Examination, by means of a study of selected original texts by the outstanding American philosophers, of their contribution to Western thought and American civilization. Prerequisite, Philosophy 25 or 51, or 52. 3 class hours. Credit, 3. Mr. Ehrlich.

68. (II) Oriental Philosophies (1963-64)

The leading philosophies of Asia with emphasis on India and the bearing of philosophical differences between East and West on the problem of mutual understanding. Given in alternate years. Prerequisite, Philosophy 25 or 51, or 52. 3 class hours. Credit, 3. Mr. Shute.

72. (II) Philosophy of Science

A critical analysis of the structure of scientific method and the language of science, the respective roles of induction and deduction in science, and the status of theoretical terms. 3 class hours. Credit, 3. Mr. Swanson.

75. (I) Symbolic Logic

An introduction to such topics as the nature of a decision procedure, completeness of quantification theory, definition of cardinal numbers via sets, object-languages and meta-languages. Prerequisite, Philosophy 31 or consent of the instructor. 3 class hours. Credit, 3. Mr. Swanson.

81. (I) Philosophy of Religion

Readings in contrasting religious philosophies followed by analysis of concepts involved in understanding religion as coherently related to the other aspects of experience. 3 class hours. Credit, 3. Mr. Shute.

82. (II) Aesthetics (1962-63)

Leading theories of the nature of art, the analysis of aesthetic experience, the distinctive function of art in culture and personality, and the principles of criticism. Given in alternate years. 3 class hours. Credit, 3. Mr. Shute.

84. (II) Political Philosophy

An attempt to develop critically the moral basis of organized societal living on all levels, with special reference to contemporary problems of sovereignty and nationalism. Prerequisites, two semester courses in philosophy, or the approval of the instructor on the basis of studies in political thought. 3 class hours. Credit, 3. Mr. Oppenheim.

85. (I) Metaphysics

Examination of metaphysical concepts in relation to their use and treatment by other disciplines. Emphasis on the problems of time, existence, reality, freedom and causality. Prerequisite, two semester courses in philosophy or the approval of the instructor. 3 class hours. Credit, 3.

86. (II) Theory of Knowledge

A study of such classical epistemological topics as the problems of perception, subject-object relation, *a priori* knowledge, the limits of empiricism. Prerequisites, two semester courses in philosophy or the approval of the instructor. 3 class hours. Credit, 3. Mr. Swanson.

95. (I) 96. (II) Seminar

In each term a study is made of one major philosopher or of one narrowly restricted subject in a special field of philosophical inquiry. Prerequisite, four semester courses in philosophy or the instructor's approval. 3 class hours. Credit, 3.

PORTUGUESE

(Instructors in Romance Languages)

1. (I) 2. (II) Elementary Portuguese

For students with no previous creditable training in Portuguese. Intensive practice in the language skills. 3 class hours, laboratory. Credit, 3.

5. (I) 6. (II) Intermediate Portuguese

For students with one year of college Portuguese or equivalent. Training in the language skills; emphasis on speaking and understanding: readings in cultural and literary texts. 3 class hours, laboratory. Credit, 3.

25. (I) 26. (II) Introduction to Portuguese Literature

Selected masterpieces of Portuguese literature presented integrally, in literary-historical perspective. Conducted in Portuguese. Either semester may be elected independently. Prerequisites: Portuguese 5, 6, or permission of the department. 3 class hours. Credit, 3.

POULTRY SCIENCE

Head of Department: Professor Thomas W. Fox. Professors Mellen, Smyth; Assistant Professors Anderson, Grover; Mr. Smith.

25. (I) Introductory Poultry Management

Basic production management for commercial poultry operations; hatchery management, breeding and rearing, disease control, housing and equipment, and management programs for broiler and commercial eggs. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Smith.

62. (II) Turkey Production

Includes the production of ducks and geese but most of the time given to the turkey industry: its importance, breeds, breeding, incubation, brooding, feeding, finishing, marketing, etc. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Smyth.

63. (I) Poultry Biology

Biological attributes of the domestic fowl. Emphasis on anatomy and physiology of the digestive, reproductive and endocrine systems and specific physiological responses to environmental influences. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Mellen.

65. (I) Marketing Poultry Products

Preparation and grading of eggs and poultry products to meet requirements of northeastern markets. Processing and packaging poultry; grading, candling and quality studies of eggs. A one-half day class trip is required at an estimated cost of two dollars. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Smith.

73. (I) Poultry Nutrition (1962-63)

The scientific principles of nutrition, nutritive classification of feedstuffs, formulation and calculation of rations for specific purposes. A class trip may be arranged. Given in alternate years. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Anderson.

77. (I) Poultry Breeding (1962-63)

The improvement of poultry by selection is developed through a study of the principles of heredity. The inheritance of morphological and physiological characters. Given in alternate years. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Fox.

78. (II) Advanced Poultry Business Management

Designed to give the student a comprehensive view of all phases of the poultry industry. Principles of poultry business management. 3 class hours. Credit, 3. Mr. Grover.

97. (I) 98. (II) Poultry Problems

Designed to allow students to pursue independent study in specific subject areas involving either extensive literature review or an experimental approach to a specific problem. Credit, 1-3. The Staff.

PSYCHOLOGY

Head of Department: Professor Claude C. Neet. Professors Feldman, Goss, Kates, Southworth, Teichner; Associate Professors Epstein, Myers; Assistant Professors Budoff, Dzendolet, Lewit, Price, Schumer; Messrs. Keochakian, Wagner; Research Associate Mrs. Myers; Visiting Lecturers Scherer, Simon, Trehub, Tallent.

1. (I) (II) General Psychology

An introduction to the principles and study of behavior. Topics considered include development of behavior, sensation, learning, thinking, motivation, intelligence, attitudes, and personality. 3 class hours. Credit, 3.

5. (I) General Psychology I

Introduction to basic concepts and methods of psychology. Topics include neural mechanisms, sensation, perception, emotion and motivation, learning and thinking, and problem solving. Credit not allowed for both Psychology 1 and 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Dzendolet and Mr. Wagner.

6. (II) General Psychology II

A continuation of Psychology 5. Topics include intelligence, human development, attitudes, conflict, personality, group processes, and personality change. Prerequisite, Psychology 1 or 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Epstein and Mr. Wagner.

28. (II) Psychology of Adjustment

Problems of personality development and adjustment are emphasized. Psychological nature of man, conflict, fantasy and thinking, and adjustment. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3, Mr. Kates.

51. (I) Sensation and Perception

A study of the data, theories and methods of studying sensation and perception. Prerequisite, Psychology 6. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Dzendolet.

52. (II) Learning and Thinking

A consideration of the effects of practice and conditions of practice on acquisition, generalization, discrimination, transfer, retention and extinction phenomena. Prerequisite, Psychology 6. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Goss.

53. (II) Motivation

The data, theories and the methods of investigating motivation. Topics include primary drives, emotions, frustration and conflict, and learned drives. Prerequisite, Psychology 6. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Wagner.

56. (I) (II) Educational Psychology

Psychological facts and principles of development, learning and measurement as applied to educational situations. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Schumer.

61. (I) Social Psychology I

Development, interrelationships, and functions of attitudes. Emphasis upon religions and political behavior, psychoanalytic and behavioristic theories of prejudice, attitude measurement, propaganda, group persuasion. Survey project. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Lewit.

62. (II) Social Psychology II

Individual behavior in groups. Interpersonal perception and communication. Norms, power, leadership, and coalition formation. Individual motivation and group problem-solving. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Lewit.

63. (I) Physiological Psychology

The neurophysiological bases of behavior. The structural and functional relationships among the nervous system, sense organs and drives. Prerequisites, Psychology 1 or 5; Zoology 35. 3 class hours. Credit, 3. Mr. Feldman.

65. (I) (II) Child Psychology

The psychological development of the child including maturation and development of behavior, language, emotions, intelligence, social behavior, motivation and personality. Nursery school observation and practice. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Price.

66. (I) Psychology of Adolescence

A consideration of the development, and emotional, social and intellectual adjustment of the individual during the adolescent years. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Price.

67. (I) Introduction to the Study of Exceptional Children

Emphasis is on the etiology, diagnosis, characteristics, education and prognosis of deviations in mental, physical and socio-emotional development. Prerequisites, Psychology 1 or 5, 65, or consent of the instructor. 3 class hours. Credit, 3. Mr. Schumer.

72. (II) Advanced Experimental Psychology

The literature, techniques, and apparatus of experimental psychology. Selected projects carried out individually by the members of the class. Prerequisites, Psychology 51 or 52, or 53; Zoology 35. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Dzendolet.

75. (I) Statistics in Psychology

The application of statistical procedures to the analysis of psychological data and to problems of measurement in psychology and related fields. Prerequisites, Psychology 1 or 5; Statistics 77 or Mathematics 62. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Myers.

79. (I) Personality

An introduction to the scientific study of personality. Topics include psychoanalytic and cognitive approaches, the influence of social-cultural conditions, personalty types and learning. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Kates.

81. (I) Psychological Tests

Survey of tests of intelligence, aptitude, interest, personality and adjustment. Test rationale, construction, characteristics, uses and evaluation are emphasized. Prerequisite, Psychology 1 or 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Schumer.

82. (I) and (II) Psychological Tests

A study of theories of intelligence and of individual intelligence tests. Prerequisite, Psychology 1 or 5. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Budoff.

83. (I) Abnormal Psychology

The etiology, symptoms and therapy of behavior abnormalities including the neuroses, psychoses, epilepsies, speech disorders and mental deficiency. Hospital trips and clinics. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Neet.

85. (I) Industrial Psychology I

Psychological principles underlying personnel selection and training, communication and decision-making in industry. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Teichner.

86. (II) Industrial Psychology II

Principles and applications of human factors data related to the analysis, design, evaluation, and use of man-machine systems and equipment. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Teichner.

87. (I) Psychology of Occupations

A study of interests, abilities and attitudes related to occupational selection, proficiency, and satisfaction. Psychological techniques fundamental to occupational research are emphasized. Prerequisite Psychology 81. 3 class hours. Credit, 3. Mr. Southworth.

88. (II) Psychology of Guidance

The psychological principles, techniques and tests necessary in guidance. Practice in organizing and evaluating relevant data in the analysis of illustrative cases. Prerequisites, Psychology 1 or 5 and 81 or consent of the instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Keochakian.

90. (II) Contemporary Psychologies

A logical, historical, and systematic analysis of contemporary psychological theories, including structuralism, functionalism, Gestalt and organistic psychologies, psychoanalysis, and behaviorisms. Prerequisite, Psychology 1 or 5. 3 class hours. Credit, 3. Mr. Goss.

92. (II) Clinical Psychology

An introduction to the theoretical approach and methods used in understanding and treating the psychologically-disturbed individual. Prerequisite, Psychology 83 or consent of the instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Epstein.

97. (I) 98. (II) Problems in Psychology

For qualified seniors. Independent work on special problems or in certain fields of psychological interest. By arrangement with the members of the department. Credit, 1-3.

PUBLIC HEALTH

Chairman: Dr. Robert W. Gage. Associate Professor Perriello, Mr. Wisnieski; also Mr. Iantosca and Mr. Snow, Division of Sanitary Engineering, Massachusetts Department of Public Health; Mr. Siino, Amherst Health Department.

61. (I) 62. (II) Environmental Health

The influence of health measures on community welfare with emphasis on all phases of environmental health. 3 class hours. Credit, 3. Mr. Wisnieski.

63. (I) Industrial Hygiene and Sanitation

The practices and principles of industrial processes involved in industrial health and sanitation. 3 class hours. Credit, 3. Mr. Perriello.

64. (II) Microscopy of Water

Microscopic forms of life exclusive of the bacteria. Counting and control of plankton in potable waters. Elements of limnology. Prerequisite, Microbiology 31. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Snow.

81. (I) Applied Public Health Bacteriology

Standard methods used in present day applied bacteriology. Subjects studied include: soils, dairy products, water and shellfish and air analysis. Prerequisite, Microbiology 31 or permission of the instructor. 2 class hours, 2 2-hour laboratory periods. Credit, 3. Mr. Perriello.

84. (II) Public Health Administration

The organization, function, and administration of governmental health agencies; including public health laws, regulations, and sanitary codes, their origin and enforcement. 3 class hours. Credit, 3. Mr. Perriello.

86. (II) Public Health Statistics

Evaluation of environmental health practices using graphical summaries and biostatistical methods. Prerequisites, Public Health 61 and 62. 1 class hour, 1 4-hour laboratory period. Credit, 2. Mr. Wisnieski.

88. (II) Epidemiology and Communicable Disease Control

The general principles of the spread of infections, supported through the study of the communicable diseases, grouped according to their modes of transmission. Admission by permission of instructor. 3 class hours. Credit, 3. Mr. Wisnieski.

90. (II) Sanitary Bacteriology

Public Health laboratory procedures including field collection of samples, stream pollution studies, food poisoning and infection, standard methods of food analysis. Prerequisite, Applied Public Health Bacteriology 81 or permission of instructor. 1 4-hour and 1 2-hour laboratory period. Credit, 3. Mr. Perriello.

92. (Summer) Supervised Field Training

A thirteen-week field training program with an official agency under the supervision of the Staff. This is a prerequisite for professional placement. 13 weeks. Credit, 3-6.

94. (II) Clinical Bacteriology

A study of procedures used in clinical laboratory work. Prerequisites, Microbiology 85, Zoology 35 or Zoology 37, 38. 1 class hour. 1 3-hour and 1 2-hour laboratory period. Credit, 3.

97. (I) 98. (II) Problems

Qualified seniors who have obtained permission from the department may arrange for independent work on special problems in Public Health. Credit, 3. The Staff.

RECREATION LEADERSHIP

Head of Department: Professor William E. Randall; Mr. Harlow.

1. (I) Introduction to Recreation

Fundamental concepts, current status, and established principles of recreation as a social force. Field trip. 3 class hours. Credit, 3.

2. (II) Social Recreation

Organization, leadership, and activity skills for the planning and conducting of social recreation programs. 1 class hour, 1 2-hour laboratory period. Credit, 2.

25. (I) Group Leadership

Foundations and tools for leadership. Successful leadership techniques for large and small groups such as clubs and communities. Field trips. 2 class hours, 1 2-hour laboratory period. Credit, 3.

26. (II) Camp Counseling

Operating procedures and program of organized camps. Camper guidance, program skills, and practical leadership experience. Two night camping trips plus one day trip. 2 class hours, 1 2-hour laboratory period. Credit, 3.

53. (I) Nature Recreation

Contemporary programs, activity skills, and leadership techniques for recreation programs based upon the natural sciences. Prerequisite, Zoology 54 or consent of instructor. Field trips. 2 class hours, 1 2-hour laboratory period. Credit, 3.

56. (II) Operation of Recreation Facilities

Functions and methods for directors of various kinds of recreation facility. Field trip. 3 class hours. Credit, 3.

77. (I) Organization and Administration of Community Recreation

Functions and methods for supervisors and assistant superintendents of various types of recreation agency. Field trip. 3 class hours. Credit, 3.

85. (I) Practice Leadership

Professional field experience with an approved cooperating recreation agency appropriate to the student's career choice. Open only to majors in the concentrated senior block. Credit, 6.

96. (II) Concepts in Recreation

Critical consideration of basic concepts and of current controversies and problems. 2 class hours. Credit, 2.

97. (I) 98. (II) Special Problems

Individual intensive study of an aspect of recreation and the presentation of results in written form. Credit, 2-3.

ROMANCE LANGUAGES

Head of Department: Professor Stowell C. Goding. Professor Ferrigno; Associate Professors Clarke, Ebersole, Johnson, Wexler; Assistant Professors Boudreau, Greenfield, Jaeger, Raymond, Smith, Stais; Mrs. Ebersole, Mrs. Fraker, Miss Golder, Mrs. Josephs, Mlle Madec, Miss Sparrow, Mr. Fraker, Mr. Franchini, Mr. Harvey, Mr. MacCombie, Mr. Mall, Mr. Robinson, Mr. Sylvia.

FRENCH

1. (I) 2. (II) Elementary French

For those who have had no previous creditable training in French. Intensive practice in the four language skills. Sequence: French 1, 2, 7, 8. 3 class hours, 2 laboratory periods. Credit, 3.

5. (I) 6. (II) Intermediate French

For those who have had some French but are not prepared to take French 7. A review and continued study of the language skills. Readings in modern French literature. Sequence: French 5, 6, 8. 3 class hours, 1 laboratory hour. Credit, 3.

7. (I) Intermediate French; French Life and Culture

An intensive review and study of the language. Readings in modern French literature. Sequence: French 7, 8. Prerequisite, French 2 or equivalent. 3 class hours, laboratory. Credit, 3.

8. (I) and (II) Intermediate French; French Life and Culture

A study of some important literary works of the 19th and 20 centuries. Compositions. Prerequisite, French 6 or 7. 3 class hours. Credit, 3.

25. (I) 26. (II) Great Works in French Literature

A study of selected complete works of several periods. 3 class hours, 1 laboratory hour. Credit, 3.

27. (I) 28. (II) Oral Practice

An advanced-level course designed to bring students to an accurate and mature grasp of French thought and expression. 3 class hours, 2 laboratory hours. Credit, 3. Mr. Smith.

51. (I) French Literature of the Eighteenth Century (1962-63)

Development of the ideas of the French Enlightenment. Given in alternate years. 3 class hours. Credit, 3. Mrs. Raymond.

53. (I) The French Theater of the Twentieth Century

A critical study of the French theater from Scribe to the present. Given in alternate years. 3 class hours. Credit, 3. Miss Clarke.

54. (II) The French Novel of the Twentieth Century

A critical study of the contemporary French novel from Proust to the present. Given in alternate years. 3 class hours. Credit, 3. Miss Clarke.

55. (I) French Literature of the Seventeenth Century (1963-64)

A study of the major works of pre-classicism, classicism and the transition, except the theater. Given in alternate years. 3 class hours. Credit, 3. Mr. Johnson.

56. (II) French Literature of the Seventeenth Century (1963-64)

A study of French drama in the seventeenth century. Given in alternate years. 3 class hours. Credit, 3. Mr. Johnson.

57. (I) French Romanticism (1962-63)

A study of the Romantic period. Given in alternate years. 3 class hours. Credit, 3. Mr. Goding.

58. (II) French Literature of the Nineteenth Century (1962-63)

A study of the main genres, schools and movements after the Romantic period. Given in alternate years. 3 class hours. Credit, 3. Mr. Goding.

65. (I) Masterpieces in Translation

The vision of man in French literature from the Renaissance to the XXth century. Not open to French majors or to students who have completed either French 25 or French 26. 3 class hours. Credit, 3. Miss Jaeger, Mr. Smith.

75. (I) Cours de Style (1962-63)

An intensive course in French stylistics. 2 class hours. Credit, 2. Mr. Smith.

77. (I) The French Renaissance (1963-64)

A study of the major writers of the XVIth century with appropriate attention to important humanistic and artistic developments. 2 class hours. Credit, 2.

78. (II) Advanced French Studies (1963-64)

A special study of a French author or literary genre. Subject to be announced at the end of the preceding academic year. 2 class hours. Credit, 2.

79. (I) French Civilization (1963-64)

A course designed for an intelligent understanding of France's life and culture. Given in alternate years. 3 class hours. Credit, 3. Mr. Goding.

80. (II) Advanced Language Study (1963-64)

A thorough examination of professional requirements and needs for the teaching of French in the U. S. 3 class hours. Credit, 3. Mr. Goding.

95. (I) 96. (II) Senior Seminar

Required for seniors majoring in French. Independent work under guidance on special problems or in certain areas of interest, including research and bibliographical techniques. Credit, 1-2.

ITALIAN

1. (I) 2. (II) Elementary Italian

For students with no previous creditable training in Italian. Intensive practice in the language skills. 3 class hours, 2 laboratory sessions. Credit, 3. Mr. Franchini.

5. (I) 6. (II) Intermediate Italian

For students with one year of college Italian or equivalent. Training in the language skills; emphasis on speaking and understanding; readings in cultural and literary texts. 3 class hours, 2 laboratory sessions. Credit, 3. Mr. Franchini.

25. (I) 26. (II) Introduction to Italian Literature

Selected masterpieces of Italian literature presented integrally, in literary-historical perspective. Conducted in Italian. Either semester may be elected independently. Prerequisites, Italian 5, 6, or permission of the department. 3 class hours. Credit, 3. Mr. Franchini.

27. (I) 28. (II) Oral Italian

The oral aspect of the language: pronunciation, vocabulary building, speeches, discussions, debates. Prerequisites, Italian 5, 6, or permission of the department. 3 class hours, laboratory. Credit, 3. Mr. Franchini.

SPANISH

1. (I) (II) Elementary Spanish

For students with no previous creditable training in Spanish. Intensive practice in the language skills. 3 class hours, 2 laboratory sessions. Credit, 3.

2. (I) (II) Elementary Spanish

Continuation of Spanish 1. To fulfill the language requirement, upon completion of this course most students are required to continue by taking Spanish 7 and 8. 3 class hours, 2 laboratory sessions. Credit, 3.

5. (I) 6. (II) Intermediate Spanish

For those incoming freshmen and transfer students who, upon placement examination, do not qualify for Spanish 7. Training in the language skills; readings in cultural and literary texts. All students in the College of Arts and Sciences who complete Spanish 6 are then required to take Spanish 8 to fulfill the language requirements. 3 class hours, 1 laboratory session. Credit, 3.

7. (I) (II) Intermediate Spanish

For upperclassmen who have completed Spanish 1-2, and those freshmen and transfer students who are found qualified by placement examination. Training in the language skills, with emphasis on speaking and understanding; readings in cultural and literary texts. Students completing Spanish 7 will fulfill the language requirement by taking Spanish 8. 3 class hours, 1 laboratory session. Credit, 3.

8. (I) (II) Intermediate Spanish: Hispanic Culture

For students who have completed Spanish 6 or 7, or by special permission of the department. Continuation of language skill training, with emphasis on reading and discussion of cultural and literary texts; composition. 3 class hours, 1 laboratory session. Credit, 3.

25. (I) 26. (II) Introduction to Spanish Literature

Selected great works of Spanish literature studied in complete text in literary-historical perspective. Conducted in Spanish. Either semester may be elected independently. Prerequisites, Spanish 8, or permission of the department. 3 class hours, discussion hour. Credit, 3. Messrs. Ebersole, Boudreau.

27. (I) 28. (II) Oral Spanish

The oral aspects of the language: pronunciation, vocabulary building, speeches, discussions, debates. Grammatical elements required for correct and fluent use of American and Peninsular Spanish. Prerequisites, Spanish 8, or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Wexler.

63. (I) Nineteenth-Century Spanish Literature (1963-64)

A detailed study of the major writers and literary movements of this period. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25-26 or permission of the department. 2 class hours, discussion hour. Credit, 2. Mr. Greenfield.

64. (II) Advanced Spanish Composition and Syntax (1963-64)

Syntax and idioms, and those more advanced difficult elements which constitute stylistics. Given in alternate years. Prerequisite, Spanish 8 or permission of the department. 2 class hours, discussion hour. Credit, 2. Mr. Ferrigno.

66. (II) Spanish Masterpieces in Translation

A detailed study of select masterpieces of Spanish literature from the Middle Ages to the present. Not open to majors in Spanish nor to students who have taken or plan to take Spanish 25-26. 3 class hours. Credit, 3.

81. (I) Modern Peninsular Spanish Literature (1962-63)

Major writers of Spain of the late nineteenth and twentieth centuries. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 or 26 or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Greenfield.

82. (II) Modern Spanish-American Literature (1962-63)

Hispanic-American letters of the late nineteenth and twentieth centuries. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 and 26 or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Greenfield.

83. (I) Drama of the Golden Age (1963-64)

Deals primarily with the *comedia* during the period of maximum creation, 1556-1681. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 and 26 or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Wexler.

84. (II) Prose and Poetry of the Golden Age (1963-64)

Masterpieces of Spanish prose of the sixteenth and seventeenth centuries, excluding the *Quijote*; development of Spanish poetry in the major poets from Garcilaso to Góngora. Given in alternate years. Prerequisites, Spanish 25 and 26 or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Wexler.

85. (I) 86. (II) Cervantes (1962-63)

Intensive reading of *Don Quijote*, with collateral readings in other Cervantine works. Conducted in Spanish. Given in alternate years. Prerequisites, Spanish 25 and 26 or permission of the department. 3 class hours, discussion hour. Credit, 3. Mr. Wexler.

95. (I) Senior Seminar

Independent work under guidance on special problems in certain areas of interest, including research and bibliographical techniques. A senior course for Spanish majors. 2 class hours, discussion hour. Credit, 2. Mr. Stais.

SOCIOLOGY & ANTHROPOLOGY

Head of Department: Professor J. Henry Korson, Professors Gordon, King; Associate Professors Driver, Wilkinson, Yablonsky*; Assistant Professors Conant*, Lopreato, Lovald, Manfredi; Visiting Lecturers Chaiklin, Laulicht, Rose, Slobodin.

25. (I) and (II) Introduction to Sociology

A study of the social order, and of the individual considered as a member of his various groups. 3 class hours. Credit, 3. The Department.

26. (II) Principles of Sociology

The theoretical development of major sociological concepts with emphasis on American sociologists. Analysis of monographs utilizing the sociological frame of references for selected areas. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Lopreato.

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* On Leave, 1961-62

51. (I) Urban Sociology

A study of urban American social conditions with reference to population, ecology, health, and the classically defined institutional complexes and their problems of adjustment. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Lovald.

52. (II) Rural Sociology

A study of rural society from the standpoint of its population, institutions, standards of living and their relation to urban society. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Manfredi.

56. (II) Race Relations

The social, economic and political aspects of racial and ethnic problems in the United States, plus briefer consideration of similar problems in Africa and Asia. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Gordon.

57. (I) and (II) The Family

The development of the customs of courtship and marriage of the contemporary American family. The basic causes of changes and trends of the family. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. King, Mr. Korson.

59. (I) Social Stratification

The factors which make for institutionalized inequality in social life. A consideration of castes and classes in American society. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Lopreato.

61. (I) Population Problems

An analytical study of population composition, focusing upon the causes and consequences of changes in the basic demographic variables: fertility, mortality, and migration. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Wilkinson.

68. (II) Industrial Sociology

The role, status, and function of the worker in the industrial community. A consideration of changing technology and the adjustment made in the industrial community. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Korson.

70. Social Structure of India

The origins, distribution, and cultural traits of the major groups in India. Special attention given to marriage, family, caste patterns, and positions in the economic and political system. 3 class hours. Credit, 3. Mr. Driver.

72. (II) Social Change

A consideration of changes arising from culture contact, social reform, and technical inventions. Planned and unplanned change, particularly with respect to underdeveloped countries. Prerequisites, Sociology 25. 3 class hours. Credit, 3. Mr. King.

75. (I) Social Problems

The incidence, distribution and interrelations among the major types of social tensions in human societies. Various theories of causation. Research projects and field trips. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Driver.

78. (II) Criminology

The nature of crimes and the factors underlying criminal behavior. The machinery of justice; the law, courts, police systems, and correctional institutions Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Yablonsky, Mr. Driver, Mr. Laulicht.

82. (II) Sociological Theory

An examination of contributions of European and American writers who have concerned themselves with theories of the origin, growth, and development of human social organization. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Manfredi.

92. (II) Introduction to Social Welfare

Methods of caring for adult and child dependents and defectives. Public and private agency administration and techniques. Federal, state, and local community programs. Prerequisites, Sociology 25. 3 class hours. Credit, 3. Mr. Yablonsky, Mr. Chaiklin.

95. (I) and (II) 96. (II) Seminar, Research Methods

A consideration of research methods and techniques employed in sociology. Each student is required to design and complete a research project of limited scope. Prerequisite, Sociology 25. Credit, 3. Mr. Lovald.

ANTHROPOLOGY

63. (I) and (II) Introductory Anthropology

An introduction to the fields of anthropology: human evolution and race; prehistory; variations among societies in kinship, economic, political and religious organizations. 3 class hours. Credit, 3. Mr. Conant, Mr. Slobodin, Mr. Wilkinson.

64. (II) Problems in Anthropology

Examination of selected problems in social structure: economic organization, kinship systems, political forms and religion of non-literate peoples. Prerequisite Anthropology 63. 3 class hours. Credit, 3. Mr. Conant.

65. (I) Ethnographic Survey of Non-Literate Peoples

The study of selected societies of Africa, Oceania, the Americas and Asia. Problems of comparing societies, especially with regard to their environmental contexts. Prerequisite Anthropology 63. 3 class hours. Credit, 3. Mr. Conant.

66. (II) The Individual and His Society

Selected approaches to the interrelations of individual behavior and social patterns, with consideration of data on "Western" and "non-Western" societies. Prerequisite, Anthropology 63. 3 class hours. Credit, 3. Mr. Lopreato.

67. (I) Ethnology of Africa

A limited consideration of the history, physical types, social organization and culture of Africa south of the Sahara with special consideration of several diverse cultures. Prerequisite, Sociology 25. 3 class hours. Credit, 3. Mr. Conant.

SPEECH

Head of Department: Professor Arthur E. Niedeck. Associate Professors Hegarty, Larson; Assistant Professors Angell, Harper, Peirce, Savereid; Misses Abramson, Hanifan, Labelle, Mr. Stromgren.

3. (I) and (II) Oral Communication

Introductory instruction and practice in oral self-expression: literary interpretation and public speaking. 2 class hours. Credit, 2. The Department.

51. (I) and (II) Voice and Diction and Oral Interpretation

Training and drill in the correct production of speech, practice in the fundamentals of vocal interpretation of literature. 3 class hours. Credit, 3. Miss Abramson.

61. (I) (II) Broadcasting in America

An intensive analysis of broadcasting in America emphasizing its evolution, economic structure, nature of the programming, and its impact on the American society. 3 class hours. Credit, 3. Mr. Harper.

62. (II) Radio Production

A laboratory course which emphasizes practical experience in all aspects of radio production and includes all the basic formats of radio programs. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harper.

63. (I) Television Production-Direction

A laboratory course emphasizing TV studio procedure and technique. Practical experience is provided in all studio crew assignments other than those involving electronics. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harper.

64. (II) Advanced Television Production-Direction

An advanced laboratory course which builds on the basic skills and techniques developed in the basic production course. Prerequisite, Speech 63. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Harper.

65. (I) Writing for Television and Film

An examination of the various formats used in telecasting and the writing methods involved. Preparation of the film scenario. Exercises in scripting for both live and filmed programs. 3 class hours. Credit, 3. Mr. Stromgren.

66. (II) Film Production

A study of the principles, tools and skills involved in film production. Includes 16mm film projects with practical work in shooting, screening and editing. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Stromgren.

71. (I) Scene Design and Construction

Theories and design in the modern theatre with assignments in developing stage settings from sketches to working drawing; from scenery construction to painting. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Larson.

75. (I) Acting and Make-up

The study of emotion and imagination in acting, reading lines, rehearsing, diction, and bodily action; the study and application of the principles of stage make-up. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Larson.

76. (II) Stage Direction

Basic elements of play structure and the director's role: choosing scripts, organizing production staff, casting, coaching, planning rehearsals and performance. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Niedeck.

78. (II) Stage Lighting

Introduction to lighting a stage. Analysis of basic types of equipment and their application in artistic productions. Simple wiring and installations. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Larson.

81. (I) Phonetics

A scientific study of the sounds of English; descriptive analysis of individual vowels and consonants. Study of the International Phonetic Alphabet; training in auditory discrimination. 3 class hours. Credit, 3. Miss Hanifan.

82. (I) (II) Introduction to Clinical Practice

Training in basic diagnostic and therapeutic techniques for various speech handicaps; emphasis on articulation defects, delayed speech and stuttering. Supervised practice required. Prerequisites, Speech 81, 85. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hanifan.

83. (I) Anatomy and Physiology of the Speech and Hearing Mechanism

A study of the anatomy and physiology of the speech and hearing mechanism; consideration of phonation, resonance, articulation and audition. Prerequisites, Zoology 37, 38. 3 class hours. Credit, 3. Miss Hegarty.

84. (II) Audiology

A study of the symptoms and causes of hearing loss; special attention to diagnostic test procedures. Supervised practice in audiometric testing. Observation; field trips. Prerequisite, Speech 85. 3 class hours. Credit, 3. Miss Hegarty.

85. (I) Introduction to Speech Pathology

A study of the causes, functional and organic, of speech problems among children and adults; principles of diagnosis and therapy. Observation; field trips. Prerequisite, Psychology 1. 3 class hours. Credit, 3. Miss Hegarty.

86. (II) Rehabilitation of the Acoustically Handicapped

Training in the techniques of speech therapy, auditory training, and speech reading for children and adults with hearing impairments. Laboratory practice under supervision. Prerequisite, Speech 84. 2 class hours, 1 2-hour laboratory period. Credit, 3. Miss Hanifan.

88. (II) Advanced Clinical Practice

Advanced training in clinical practice under supervision; special consideration of organic speech disorders. Opportunity for supervised clinical practice at Lemuel Shattuck Hospital. Prerequisite, Speech 82. 2 class hours, 1 2-hour laboratory. Credit, 3. Miss Hegarty.

91. (I) and (II) Public Speaking

The study and application of principles governing the composition and delivery of public speeches. 3 class hours. Credit, 3. The Department.

92. (II) Discussion

The study of the principles of group discussion and their application to major contemporary problems. 3 class hours. Credit, 3. Mr. Savereid.

93. (I) Argumentation and Debate

The study and application of reasoning and evidence as it is used in public deliberation. Prerequisite, Speech 91 or permission of instructor. 3 class hours. Credit, 3. Mr. Angell.

94. (II) Persuasion

Advanced study and practice in appeals to beliefs and action through extemporaneous speech. Prerequisite, Speech 91 or permission of instructor. 3 class hours. Credit, 3. Mr. Savereid.

96. (II) Seminar in Speech Pathology

Individual student reports on selected topics in the field of speech pathology. Prerequisite, Speech 85. 3 class hours. Credit, 3. Miss Hegarty.

VETERINARY SCIENCE

Head of Department: Professor Glenn A. Snoeyenbos. Professor Smith.

75. (I) Comparative Veterinary Anatomy

The structure of vertebrates with emphasis upon the comparative structure of domesticated animals, both mammals and birds. 3 class hours. Credit, 3. Mr. Smith.

76. (II) General Veterinary Pathology

An introduction to the study of disease; application of principles to the prevention, control, and eradication of the common communicable and non-communicable diseases of farm animals. Prerequisite, Veterinary Science 75. 3 class hours. Credit, 3. Mr. Smith.

78. (II) General Veterinary Pathology

This course is similar to Veterinary Science 76 except that diseases of importance to wildlife, and diseases of animals transmissible to man will be considered. Prerequisites, Microbiology 31; Zoology 35 or 71. 3 class hours. Credit, 3. Mr. Smith.

88. (II) Avian Pathology

This course is similar to Veterinary Science 76 but with application to specific communicable and non-communicable diseases of poultry. Prerequisite, Veterinary Science 75. 3 class hours. Credit, 3. Mr. Bullis.

ZOOLOGY

Head of Department: Professor Donald Fairbairn*. Professors Anderson, Bartlett, Honigberg, Rauch, Snedecor, Traver; Associate Professors Nutting, Rollason, Swenson; Assistant Professors Andrews, Harvey, Moner, Roberts, Snyder; Mrs. White.

1. (I) (II) Introductory Zoology

Introduction to the principles of biology with special reference to the cell and its metabolism and to the anatomy, physiology and evolution of the major groups of the animal kingdom. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Rollason and staff.

25. (I) Survey of the Animal Kingdom

Emphasis on such topics as adaptation, symbiosis, ecology, and evolution, and a consideration of major animal phyla which best illustrate these topics. Several field trips. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Nutting.

35. (I) (II) Vertebrate Physiology

Includes consideration of circulation, respiration, digestion, metabolism, excretion, chemical and nervous coordination, muscular activity, and reproduction. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboraatory period. Credit, 3. Mr. Snedecor.

37. (I) 38. (II) Anatomy and Physiology

An introduction to human anatomy and physiology. The subject matter will include skeletal, nervous, muscular, cardiovascular, respiratory, digestive, excretory, endocrine, and reproductive systems. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Moner.

50. (II) Histology of the Vertebrates

Study of the cell, tissues, and microscopic anatomy with emphasis on the mammal. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Rollason.

51. (II) Microtechnic of Animal Tissues

A series of practical exercises employing the basic methods of preparation of tissue for microscopic examination; consideration of the principles involved in the various methods. Prerequisite, Zoology 1. 2 2-hour laboratory periods. Credit, 2. Mr. Honigberg.

53. (I) Principles of Genetics

Mechanisms of heredity in plants and animals including man, emphasizing transmission and action of genes, population genetics and evolution. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Rauch.

54. (II) Natural History

Designed to orient the student to features of sky, climate, and terrain, of importance to the teaching naturalist. Methods of identification, collecting data, etc. Prerequisites, Botany 1; Zoology 1. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Nutting.

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* As of September 1, 1962

55. (I) Natural History

Comparison of aquatic and terrestrial communities from the naturalist's viewpoint. Special attention given to distribution, seasonal responses, and biotic interrelationships. Prerequisites, Botany 26; Geology 27; Zoology 54. 1 class hour, 1 4-hour laboratory period. Credit, 3. Mr. Nutting.

56. (II) Natural History

Field studies of selected series of plant and animal species. Emphasis on seasonal differences in abundance, developmental stages, and response to factors of the environment. Prerequisites, Zoology 55 and permission of instructor. 1 class hour, 1 2-hour laboratory period. Credit, 2. Mr. Nutting.

64. (II) Biology of Protozoa (1963-64)

Morphology and physiology of Protozoa, with emphasis on the contributions made to the basic problems of biology through the study of these organisms. Given in alternate years. Prerequisites, Zoology 1 and permission of instructor. 1 class hour, 1 2-hour and 1 3-hour laboratory period. Credit, 3. Mr. Honigberg.

69. (I) Animal Parasitology

Representative protozoan and helminthic parasites of man and domestic animals are studied, emphasizing morphology, life cycles, and parasitism as a mode of life. Prerequisite, Zoology 1. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Miss Traver.

70. (II) Invertebrate Zoology

Survey of the phyla of invertebrate animals from evolutionary and phylogenetic aspects. For each phylum, representatives of the principal classes are studied. Prerequisite, Zoology 1. 1 class hour, 2 3-hour laboratory periods. Credit, 3. Miss Traver.

71. (I) Comparative Vertebrate Anatomy

A systematic approach, stressing adaptation, functional specializations and evolution. Laboratory study primarily on fish and mammals. Prerequisite, Zoology 1. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Bartlett, Mr. Snyder.

72. (II) Embryology

Description of the development of amphibian, bird, and mammal. Introduction to experimental embryology stressing biochemical studies of ontogeny. Prerequisite, Zoology 71. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Harvey.

74. (II) Limnology (1963-64)

Study of inland waters from geological, physical, chemical and biological aspects. Given in alternate years. Prerequisite, Botany 1; Zoology 1; Chemistry 1, 2; and permission to register. 2 class hours, 2 3-hour laboratory periods. Credit, 4. Mr. Andrews, in cooperation with the departments of Botany, Entomology, Public Health, Geology, and Zoology.

78. (II) Genetics of Animal Populations

Principles of population genetics emphasizing this approach to the study of species formation and human genetics. Enrollment limited to ten. Prerequisites, Zoology 53 and permission of the instructor. 1 2-hour lecture discussion period. Credit, 2. Mr. Rauch.

80. (II) Ornithology

An introduction to avian biology emphasizing the correlation of structure, function and behavior; identification. Prerequisite, Zoology 1. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Bartlett, Mr. Nutting.

81. (I) Vertebrate Zoology

An introduction to the vertebrates, their classification and ecology, with particular emphasis on the fishes. Field trips for the study of local fauna. Enrollment limited to twenty. Prerequisite, Zoology 1. 1 class hour, 2 2-hour laboratory periods. Credit, 3. Mr. Andrews.

82. (II) Mammalogy

Evolution, distribution, classification, and ecology of mammals. Laboratory will include field trips, preparation of study material, and identification of local fauna. Enrollment limited to 15. Prerequisites, Zoology 1 and permission of instructor. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Snyder.

83. (I) General and Cellular Physiology

The fundamental processes common to all cells. Emphasis on the physics and chemistry of single cells. Prerequisites, 1 year of Biology; Organic Chemistry. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Swenson, Mr. Moner.

84. (II) Comparative Physiology

Physiological principles involved with the evolution of the adaptations in animals to their environments. Prerequisite, Zoology 83, or the consent of the instructor. 3 class hours, 1 3-hour laboratory period. Credit, 4. Mr. Roberts.

86. (II) Fishery Biology

Theory in the practice of regulating freshwater fisheries; the physical and biological conditions of the environment and their influence on fish population. Prerequisites, Zoology 81 and permission of instructor. 2 class hours, 1 2-hour laboratory period. Credit, 3. Mr. Andrews.

87. (I) Endocrinology

The importance of the endocrines in their control over normal functions (growth, metabolism, reproduction, etc.), in a variety of animals. Prerequisite, Zoology 1. 2 class hours, 1 3-hour laboratory period. Credit, 3. Mr. Snedecor.

97. (I) 98. (II) Special Problems in Zoology

Qualified students who have met departmental requirements for specialization in the field of zoology may arrange for work on a special problem in zoology. Credit, 1-3.

Invertebrate Zoology, Marine Biological Laboratory, Woods Hole, Massachusetts. Credit, 3.

Invertebrate Embryology, Marine Biological Laboratory, Woods Hole, Massachusetts. Credit, 3.

INTERDEPARTMENTAL COURSES

Comparative Literature 91. (I) Anglo-German Literary Relationships since 1750

Study of subjects and problems common to English and German literature since the middle of the eighteenth century with some attention to German-American literary relationships. By permission may be counted for major credit in English and German. 3 class hours. Credit, 3. Mr. Heller, Mr. Page.

Linguistics 93. (I) Linguistics

A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature. By permission may be counted for major credit in English, German, and Romance Languages. Prerequisites, English 25, 26. 3 class hours. Credit, 3.

Social Science 60. (II) Africa, South of the Sahara

An introductory study of recent political, economic, and social developments in the principal countries of Africa, south of the Sahara. By permission may be counted for major credit in government and sociology. Prerequisites, at least two semester courses in one or more of the following fields: economics, government, sociology. 3 class hours. Credit, 3. Miss Carter.

Social Science 69. (I) India and Southeast Asia

An introductory study of recent political, economic, and social developments in India and the countries of South and Southeast Asia. By permission may be counted for major credit in government and sociology. Prerequisites, at least two semester courses in one or more of the following fields: economics, government, sociology. 3 class hours. Credit, 3. Mr. Driver.

University Studies: Honors 51—Junior Honors Symposium

The presentation and discussion of topics emphasizing inter-relationships of the various disciplines and selected topics in specialized subject matters. For junior honors students. Instructors: visiting lecturers. Meets once a month. No academic credit.

Computer Science 21. (I) (II) Introduction to Automatic Computation

An introduction to the programming of digital computers. Topics included are basic programming systems, compiler languages, and the logic of programming and compilation. Prerequisite, Mathematics 2 or 4. 1 class hour. Credit, 1. Mr. Kim.

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* On Leave of Absence.
** To September 1, 1962.

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UNIVERSITY OF MASSACHUSETTS ENROLLMENT — September, 1961

UNDERGRADUATE COLLEGE

Class	1962 Men	1962 Women	1963 Men	1963 Women	1964 Men	1964 Women	1965 Men	1965 Women	Total Men	Total Women	Total
Arts and Sciences	262	206	392	282	429	382	664	500	1747	1369	3116
Engineering	152	1	161	—	221	3	297	1	831	5	836
Business Administration	97	4	125	7	123	11	129	6	474	28	502
Education	—	85	—	127	1	111	2	100	3	423	426
Agriculture	76	3	100	5	69	2	82	4	327	14	341
Physical Education	35	11	46	31	31	21	55	16	167	79	246
Home Economics	—	29	—	26	—	33	—	26	—	114	114
Nursing	—	19	—	21	—	26	—	36	—	102	102
Total	622	358	824	499	874	589	1229	689	3549	2135	5684
Total by classes	980		1323		1463		1918		5684		

Specials	29	67	96
TOTAL			5780

GRADUATE SCHOOL

Men	Women	Total
670	175	845

STOCKBRIDGE SCHOOL OF AGRICULTURE

	1961	1962	Total
Men	148	233	381
Women	2	11	13
	150	244	394

SUMMARY

Undergraduate School	5779
Graduate School	845
Stockbridge School	394
GRAND TOTAL	7018

Office of Publications, September, 1961

GIFTS AND BEQUESTS

For the information of those who may wish to make a gift or a bequest to this University, the following suggestion is made as to a suitable form which may be used.

There are a number of worth-while activities of the University which are handicapped by lack of funds and for which small endowments would make possible a greater measure of service to our students and to the Commonwealth. The religious work on the Campus is an example. This is now carried on in a very limited way by current private contributions. Further information concerning this and other activities in similar need will be gladly furnished by the President.

SUGGESTED FORM

"I give and bequeath to the Trustees of the University of Massachusetts, at Amherst, Massachusetts, the sum of..... .....dollars."

(1) (Unrestricted)

"To be used for the benefit of the University of Massachusetts in such manner as the Trustees thereof may direct."

or (2) (Permanent Fund: income unrestricted)

"to constitute an endowment fund to be known as the .... Fund, such fund to be kept invested by the Trustees of the University of Massachusetts and the income used for the benefit of the College in such manner as the Trustees thereof may direct."

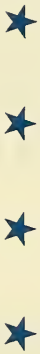
or (3) (Specific Purposes)

"to be used for the following purposes,"

(Here specify in detail the purposes.)

UNIVERSITY OF MASSACHUSETTS

REPORT OF THE PRESIDENT • 1961



To The Board of Trustees

One of the great forces contributing to progress in American history in the last century has been the continuing capacity of the Land-Grant colleges and universities to adapt to the demands of a constantly changing, constantly expanding society. Since passage of the Morrill Act of 1862, public institutions of higher learning have met the country's pressing needs from the time of the great agrarianism of the later nineteenth century to the age of space exploration now in its opening phases. These contributions have not been in the area of material progress alone. By the very nature of their objectives, the Land-Grant institutions have made comparable contributions to the social and cultural life of the nation as well.

As we at the University of Massachusetts join in observing the 100th anniversary of the signing of the Land-Grant Act of 1862, we feel that we may look back proudly on this Century of Accomplishment. But at the same time we realize that our mission is to the future, to the next 100 years. If we do indeed have an inherent and ready capacity to adapt, and if our adaptability has served society well in the past, then all that has gone before is a prologue to the great mission ahead of us.

Call it evolution or revolution, the process of history in the last 100 years has been a relentless democratizing of our educational community. Before long, the public institutions will be the dominant means of educating America's citizenry — in the arts and humanities, in science and technology, in all of the professions and callings constituting the lifeblood of a free society.

The danger, however, for any one of these institutions is that it will fail to appreciate the national role it must play. This does not mean that, to play such a role, the state university must neglect the immediate public it serves. But the people of every state are part of a whole, and no state is unique in its major attitudes and aspirations. All these are bound up in the national purpose, in the best objectives of American society — and no state really prospers unless, educationally and otherwise, it contributes to the prosperity of the nation as a whole. The current "master plan" of any Land-Grant institution, therefore, must be based on our national objectives, on those goals which for our time in history, impel all Americans to work for a better national and world community.

The following report, though not exhaustive, is an attempt to show the various ways in which the University of Massachusetts during the year 1961 sought to fulfill these goals and objectives.

Respectfully,

John W. Lederle

JOHN W. LEDERLE
PRESIDENT

THE STUDENT: INDIVIDUAL IN AN EXPANDING SOCIETY

During the year covered by this Report, the American educational community continued to express insistent concern over numbers — the numbers of students coming out of our exploding population and into the colleges and universities of the land.

For the past decade, this has been the theme under which most institutions of higher learning have labored. And though repetition of a theme may become irritating, the American public will hear this one for many years to come. If we wish even minimally to fulfill our national goals and maintain ourselves as a society and a culture, we must acknowledge, much more than we have so far, that these numbers are not mere statistics of little concern to most of us, but that they represent the basic resource of a free and progressive nation.

Here at the University of Massachusetts, the Registrar's Office in 1961 submitted dramatic evidence of the abundance and ready availability of this resource. The Registrar's Report indicated that for the academic year 1954 a total of 3,281 applicants sought admission to a freshman class necessarily limited to 1,200 places. In 1961, a total of 6,521 students applied for admission to a first-year class of 1,850. Thus, while the applications over this short seven-year period increased by 200 per cent, the number of available places in the freshman class increased by only 58 per cent. And even if we allow for the increasing propensity among students to file duplicate applications, it is still obvious that the Commonwealth and the country are losing the fine potential of the numerous applicants for whom there are no places.

This does not mean that the University of Massachusetts has lagged in trying to provide places for all qualified applicants. Through the enlightened support of the General Court, immense strides have been taken in providing the facilities needed to do an adequate job. The press of applicants is so great, however, that the short range is not time enough in which to catch up and move forward.

With 92 per cent of the cities and towns of Massachusetts represented in the student body, the University today enrolls 7,000 students, more than it ever has in its history — and each new year sets a new record for enrollment. All of this indicates that here at the University, and at public universities throughout the country, there must be adequate planning for an effective response to the challenge of numbers. And yet, the enrollment problem is only the most overt element in a situation that involves crises and opportunities unlike any experienced in similar degree since the nation's founding. Our principal concern is to turn all this to good account, to convert crisis into opportunity, and problems into accomplishments.

Viewing our undergraduates as a principal natural resource, we took steps in 1961 to help students realize their greatest individual potential. Perhaps the most important step was the establishment of the post of Dean of Students. In an increasingly complex curricular and extracurricular program, the need for coordination of efforts to spur our students to greater degrees of individual excellence has been the most persistent that we have had. If it is indeed one of the nation's highest concerns that her citizens have every chance to develop as "human beings of infinite worth," then our educational institutions must be prepared as never before to translate opportunity into action through specific mechanisms of wise administration. Creation of the new position of Dean of Students at long last gives us the means of establishing these mechanisms in effective fashion.

Among the new Dean's responsibilities is that of guidance of our undergraduates toward the best use of their intellectual energies. Great gains have already been made in our general program through the excellent summer testing and counseling sessions held each year for all of our entering freshmen. Early determination of the degree and kind of talent possessed by each student has meant a decrease in heartbreak and waste among those who need careful guidance in building their college careers.

Allied with freshman testing and counseling has been the Advanced Placement Program which in 1961 gave strong evidence that Massachusetts students are getting more than satisfactory instruction in most of the Commonwealth's secondary schools. Thus, approximately one-third of the freshman class entering in September 1961 earned the right to by-pass one or more introductory courses and go on to advanced courses.

"... the basic resource

of a free

and progressive

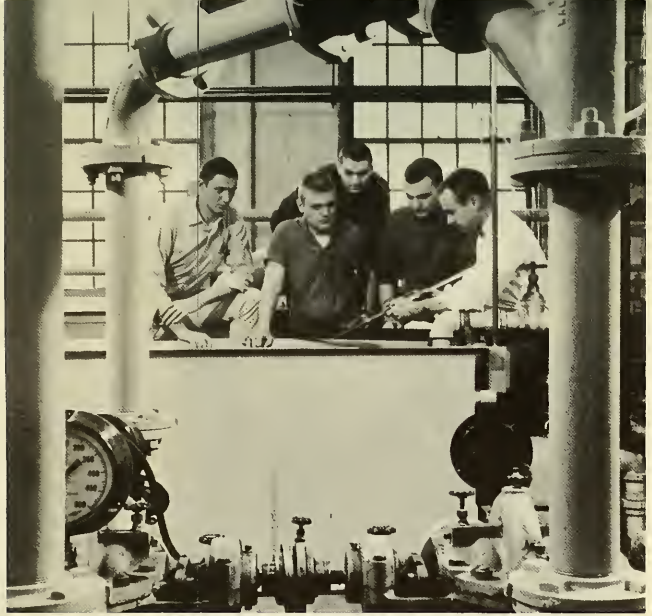
society"

In addition, the University found that the number of talented students was high enough to permit the Honors Colloquium Program to enroll freshmen as well as sophomores and juniors. Although the freshman program would not begin until the second semester of the academic year 1961–62, it was amply clear that not only were many of our freshmen able to take these special seminars requiring a great amount of independent effort, but some of the first-year students could in fact jump to the sophomore colloquia. These and other activities on behalf of our superior students, now constituting a complete freshman-to-senior Honors Program, are directed toward giving each of our undergraduates freedom to develop his capacities to the fullest.

In some quarters, creation of such opportunities for the most talented is considered the major aim. But what of the "average" student? More often than is reasonable, the less-talented scholar (by purely academic standards) is shunted to the hinterland instead of getting the close attention society should give him.

If in this critical era "every American is summoned to extraordinary personal responsibility, sustained effort, and sacrifice,"* then our notion of the kinds of students meriting a reciprocal degree of concern must include those who on their records demonstrate something less than brilliant achievement. Our conception of excellence must admit of gradations. There is the excellence sustained by the obviously outstanding scholar — but there

*Goals for Americans; The Report of the President's Commission on National Goals, New York, 1960, p. 1.



Indispensable frame of reference —
teacher and student,
mind to mind

is also the excellence of the student who, though not intellectually exceptional, performs effectively because of superior motivation.

Most important of all, then, we must not make idle claims that we are interested in *all* our students when in actual practice we often reveal that this is not true. Professors concerned with development of honors programs for the limited few who can profitably proceed at an advanced pace with a minimum of formal direction should give attention also to the generality of students who need their guidance even more.

Our democratic approach to higher education, unparalleled on such a broad scale, must sustain itself on a balanced basis. To appear to believe in such a democratic approach, and to practice something different, is to turn away from an historic process that the educationally dispossessed of many fully developed nations would give much to experience.

All of our state universities must therefore regard the role of the teacher on campus as first among all functions undertaken in the total program, though obviously not to the exclusion of other important and allied functions. We must have more "men of substance" in our classrooms, men who actively pursue the scholarly life and effectively communicate both the fact and the spirit of knowledge to their classes. While we strongly encourage research and publication, we look first for the teacher-scholar who demonstrates that he is committed to imparting knowledge and the zest of learning to his students.

The clear danger in any other commitment in the undergraduate program is that our students will find the search for knowledge a perfunctory pursuit — as evidenced in the uninspired meanderings of many of today's expositions from the front of the classroom. The allied danger is that graduate education and advanced research will surely atrophy if the will of our undergraduates to aspire to these higher activities is blighted by poor teaching.

It is mandatory, therefore, that we continue to guard and cherish the teaching function as the most productive means we have to insure the flow of dedicated graduates into the more demanding channels of advanced study or careers among the various professions. If we produce only mediocrities born of a system of mediocre instruction, then we have failed as a university. Through all the resources in our power, this we do not aim to do.

The University in 1961 expressed its concern not only for the academic well-being of students, but also for their economic welfare. At a time when voices are still being raised against the idea that education is an investment worthy of enlightened support by the public whom it serves, the Office of the Dean of Students conducted a survey of parents of the members of our freshman class.

The responses dramatically indicated that if we are to win in the Cold War "competition of brains," we must be willing *as a society* to see to it that the desire of our young people to enter college is not blunted by the prospect of mounting college costs. Although some student borrowing is

Interest and commitment —
the vital ingredients

necessary, we consider unrealistic the proposals made in some quarters that students be forced to take major loans as a means of defraying costs. A society of individuals dragged down by large debts at an early stage in their lives is hardly a society free to accomplish great things.

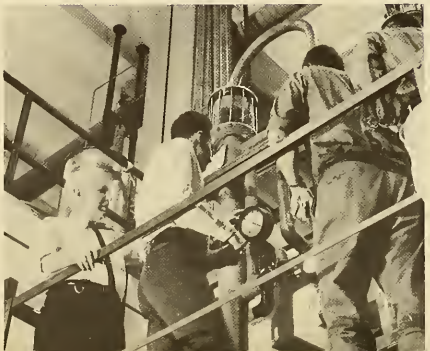
Our survey** clearly showed that the earning power of parents is far from enough to pay a student's way through college, even with the relief provided by summer earnings. Many parents have two or three or more children in college at the same time, and the financial drain is therefore enormous. Effective relief must come, to a great extent, through increases in the scholarship and small-loan funds by which our students can be helped to move with reasonable serenity through their four years of college.

We are particularly interested in raising our scholarship funds from the relatively meager amounts we now apportion among our needier students to the much larger funds we should have to do our job well. Because we believe that scholarship grants are investments in our society and economy, we feel strongly that such funds should come from all sectors of society — from private individuals and foundations, from business and industrial organizations, and from the State and Federal governments.

Through these means we can much more effectively oppose the rising tide of college-trained youth in the Iron Curtain countries with an even greater tide of well-educated young people here in the United States. Sustaining this preponderance may well mean ultimate victory in the clash of competing ideologies.

**Copies of *Parents' Ability to Meet College Costs at the University of Massachusetts* are available at the University's Office of Institutional Studies.

. . . in engineering



. . . in science

. . . in art

THE UNIVERSITY AND THE LARGER COMMUNITY

In 1961 the University of Massachusetts made significant gains in its program on campus and in the larger community it serves beyond the environs of Amherst.

Important developments on campus included six major appointments — Dr. Gilbert L. Woodside as Provost, Dr. William F. Field as Dean of Students, Dr. I. Moyer Hunsberger as Dean of the College of Arts and Sciences, Dr. Arless Spielman as Dean of the College of Agriculture, Dr. Marion Niederpruem as Dean of the School of Home Economics, and Dr. Leo Redfern as Director of the new Office of Institutional Studies.

In addition to a number of changes and improvements in the undergraduate curriculum, the University took great strides forward in the opening of the Research Computing Center and the Polymer Research Institute. Both facilities reflect the growing importance attached to the advanced studies program undertaken by University researchers on a concerted basis.

To the great community beyond the campus, the University as a Land-Grant institution manifested its commitment in many ways. Perhaps the most refreshing activity undertaken on behalf of the "larger community" was that of the men's senior honor society, Adelphia. As members of SCOPE, the Special Committee on Promising Entrants, Adelphians joined with faculty members on the committee in planning to bring to campus outstanding juniors from high schools throughout the Commonwealth. Scheduled to begin in April, 1962, the visits have been planned as a means of introducing superior high school students to the facilities available to them at a modern state university.

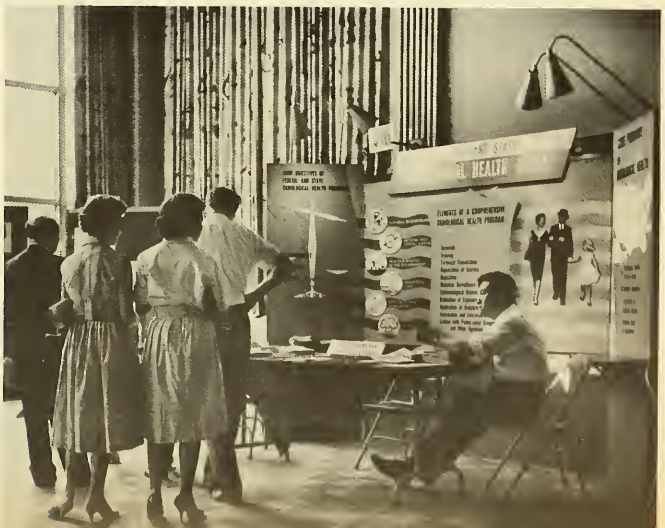
Among the most important aspects of this activity is the time and energy put into the project by each member of Adelphia as a means of attracting talented high school students to the University of Massachusetts. The success of the program is almost certainly assured when University students evince sufficient pride in the values inculcated at their institution to want to spread the word about it. The administration applauds the obligation Adelphia has undertaken and looks forward to the successes it will sustain in its efforts.

The University's faculty, like its students, has continued to conduct major activities serving important constituencies within the state. The Science Fair held in 1961 was again a very important success, bringing to the campus some of the most creative young minds produced in area schools. Allied with the Fair was a Science Congress conducted for high school teachers of science and mathematics. The combined event was a significant experience for all who participated in it.

The annual Prize Competition in Mathematics was again held in 1961 under University auspices. Supported by several insurance companies and conducted by the Department of Mathematics, the Competition enjoyed state-wide interest and served effectively to indicate that such University-initiated activities are very important in maintaining vital incentives among our secondary school students.

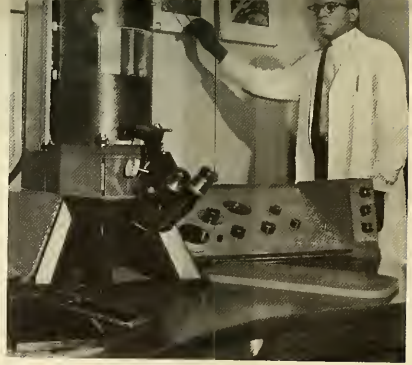
Service to the community:

display at University Open House



RESEARCH: VITAL MISSION IN THE PUBLIC INTEREST

Work in environmental psychophysiology



Deep cell study — using the electron microscope

The Bureau of Government Research rendered direct public service to the Commonwealth's municipalities through its continuously expanding program. A major accomplishment in 1961 was the establishment of the Massachusetts League of Cities and Towns, inaugurated with the active support and help of the University's Bureau. Requests for publications continue to rise, and staff members of the Bureau are increasingly called upon to participate in meetings of civic groups and public officials.

The Speech and Hearing Center continued to serve the needs of hundreds of afflicted children and adults. Crucial help was given to University students who have speech or hearing problems. In the all-important training program for therapists, a major advance was the establishment of a graduate program for master's degree candidates. In addition, plans have been initiated for the development of a doctoral curriculum in this vital area under the Four College Cooperation Program. Also, complete details were worked out between the University and the Lemuel Shattuck Hospital in Jamaica Plain for supervised clinical practice for advanced students in speech and hearing therapy. The impact of such a comprehensive training program will be felt in striking measure in the years to come. It promises to relieve to a very great extent the needless waste of human talents and resources resulting from correctible speech and hearing deficiencies.

The School of Education's new building has facilitated the fostering of programs having impact on the educational community throughout the Commonwealth. The Mark's Meadow School, through its experimental approach to teaching techniques on the elementary level, has already spurred the interest of a wide audience of teachers, administrators and researchers. Facilities such as the reading clinic have given rise to expectations that the School of Education in its research program will make solid contributions along a broad front.

Various departments have conducted special lecture and seminar programs for teachers in the Commonwealth's school systems. The Botany and Chemistry departments, for instance, maintained research participation programs under grants from the National Science Foundation for high school teachers, college instructors, and superior undergraduates.

The Department of Romance Languages continued to make important contributions to the Commonwealth's teachers in this field. The Romance Languages faculty published the *Bay State Foreign Language Bulletin*, issued to all high school teachers in the field; edited *Hispanofila*, an outstanding literary and scholarly periodical; and conducted tours and demonstrations of the 80-booth Language Laboratory which is serving as a prototype for many secondary school facilities of this kind.

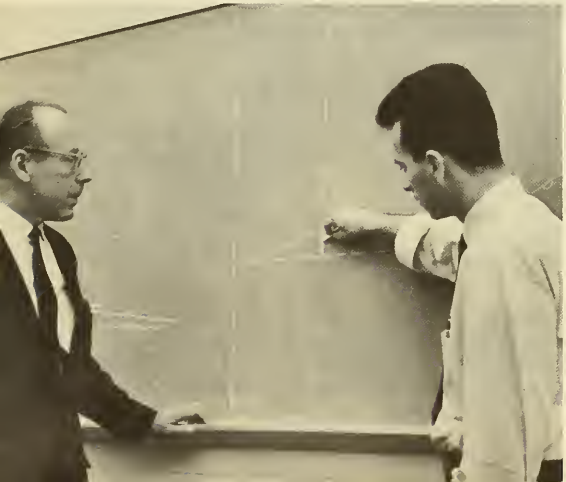
The student-sponsored Distinguished Visitors Program and the War Memorial Lectures sponsored by the Associate Alumni gave students, faculty and people from the surrounding area excellent opportunities to hear world figures discuss topics of major importance. The War Memorial

Lecturers in 1961 included historian Oscar Handlin and poet Robert Frost. The much-honored American "poet-laureate" spoke in the fall to perhaps the largest audience ever gathered in the Student Union — 3000 persons. Through the facilities of the campus radio station WMUA-FM and the Four College station WFCR-FM, Mr. Frost's reading was beamed live down the Eastern seaboard along a network of stations extending to Washington, D. C.

The Distinguished Visitors Program brought Aaron Copland and Mrs. Eleanor Roosevelt to the campus and cooperated with University departments in bringing other speakers. The Department of Government through its Colloquia in Political Science sponsored appearances by former French premier Pierre Mendes-France and Madame Lakshmi Menon, Deputy Foreign Minister of India — among many others.

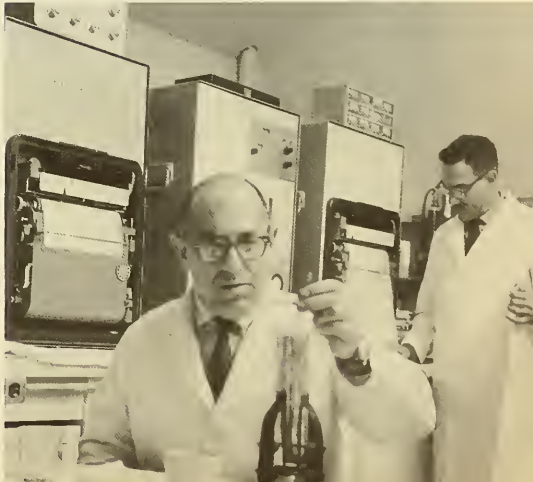
Nationally, the University has been making major contributions in committees whose membership includes personnel from our faculty. Thus, Dr. Merit P. White of the Department of Civil Engineering continues to serve as chairman of the Protective Construction Committee of the National Academy of Sciences. A consultant to the U. S. Air Force, he was a U. S. delegate to the International Association for Materials and Structures.

Concerted study for greater understanding of plastics and their properties — in the new Polymer Research Institute. This and other advanced studies at the University are served by the Research Computing Center, major data-processing facility opened in 1961.



Left — Mathematics for the shaping of a modern world — work in civil engineering

Right — Gas chromatographic analysis in food science and technology.



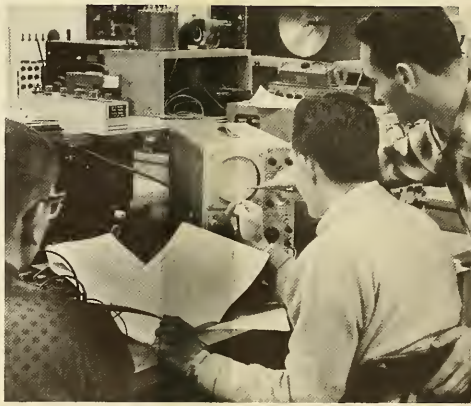
In the College of Agriculture, Dean Arless A. Spielman was appointed to the *ad hoc* committee of the Cooperative State Experiment Station Service for Federal-State Relations. He was also named by the Governor of the Commonwealth as Council Coordinator representing Massachusetts to the Food for Peace Council. Professor George Westcott of the Department of Agricultural and Food Economics was appointed by the U. S. State Department as a special consultant on the economic development of the northeast region of Brazil, where he spent several months as part of a study team. Also appointed a special consultant was Dr. Warren Litsky of the Department of Microbiology. Dr. Litsky was named by the U. S. Public Health Service to a three-year consultative post with the Research Branch, Division of Water Supplies and Pollution Control of the New York Regional Office.

One of the most important developments in the academic program in 1961 was the establishment of an exchange arrangement involving students from the University of Massachusetts, the University of Florida at Tallahassee, and the University of New Mexico. The program calls for a semester's exchange of students in the teacher-training curriculum of each of the participating universities. The *New York Times* cited the program as a potentially important means of breaking down sectional barriers to understanding and national educational development.

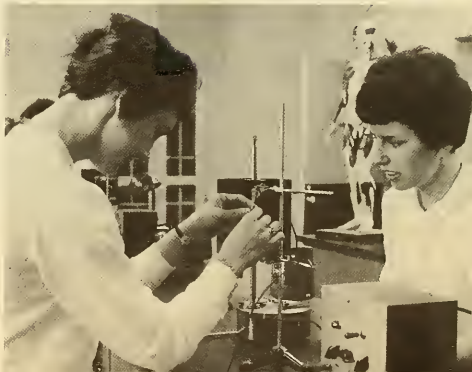
Two members of the Department of Zoology entered a program conducted by the American Institute of Biological Sciences for work with high school groups throughout the United States. Dr. William B. Nutting visited Hawaii in connection with this work, and he and Dr. Lawrence Bartlett fulfilled other assignments under the program's auspices.

On the international scene, the University made various contributions The School of Business Administration, in conjunction with the Experiment in International Living, once again conducted its highly successful Junior Executive Training Program for young European businessmen. Dean Albert W. Purvis of the School of Education was leader of an American team of educators exploring the possibility of establishing a girls' school in Uganda — a project fostered by the U. S. State Department as part of a program to serve the African nations in their thirst for education.

The stature of many of our scholars can be gauged by the assignments they receive for various national and international activities. In 1961, for instance, Dr. Bronislaw M. Honigberg of the Department of Zoology attended the First International Conference on Protozoology in Prague, Czechoslovakia, and presented lectures in Poland and Israel. Dr. I. Moyer



Teacher, engineer, scientist of tomorrow — students are introduced to the challenges and opportunities of the professional in a complex society.



Hunsberger, Dean of the College of Arts and Sciences, is directing a nationwide study of chemical notation systems for the National Academy of Sciences and the National Research Council. The study is being supported by a National Science Foundation grant. Dr. H. T. U. Smith, head of the Department of Geology, was a member of the U. S. delegation to the International Quaternary Association Congress in Poland. Dr. Luther Allen was Visiting Professor at the University of Saigon in South Vietnam under a Smith-Mundt Grant. Dr. Thomas Copeland of the Department of English spent much of the year in England where he continued his work as Editor-in-Chief of a projected eight-volume collection of the private papers of Edmund Burke. Dr. Copeland is the general director of a project to which many important scholars of the English-speaking world are making contributions. Professor Walter G. O'Donnell of the School of Business Administration served during the summer as consultant in management at the University of Puerto Rico and aided in the development of the University's graduate program. As chairman (and founder) of the newly established College of Philosophy of the Institute of Management Science, Professor O'Donnell presented a paper at the Institute's meeting in Brussells, Belgium. Several members of the faculty held Fulbright and other grants for study and lecturing in areas as far apart as Iceland and New Zealand.

Although the ICA-sponsored exchange program with Hokkaido University in Japan has terminated, it is expected that, under other auspices, the exchange will continue as it has in the past — productively for both institutional participants.

The Massachusetts Review, originally founded on the University's campus, continued to speak as a distinguished organ in the fields of art, literature, and public affairs. In 1961 the magazine became a Four College Project after the voting of funds to support the *Review* for a three-year period. The magazine is literally an international periodical, not only in the wide-ranging nature of its contents, but in the following it enjoys among subscribers and contributors in many countries of the world.

Incomplete though this listing may be, it should serve to show that there is vitality, commitment, and distinction in the activities carried on by the University in "the larger community." We intend to go further. We intend to increase and enrich our programs so that our objectives may help materially in furthering the general objectives of our national community. Given this great variety of resources, and the historic capacity of Land-Grant institutions to adapt to changing conditions, we are better able than ever to serve these objectives.

THE UNIVERSITY AND THE DEMOCRATIC PROCESS

It is one of the paradoxes of American democracy that our citizenry, generally realizing that it can maintain democratic institutions only through the political or governmental process, is nevertheless often apathetic about that process. The voter often concludes that "politics is dirty business" and turns his back on the ballot box and all other instrumentalities dedicated to preserving a democratic society.

This is wrong. And a public university must use its instructional and research resources in positive programs serving to counter the "alienated" citizen's ready tendency to decry and deplore the processes under which all Americans remain free.

One of the University's chief means of providing substantive evidence that politics can be a matter of high statesmanship and dedicated service is through the Distinguished Public Affairs Professorship, now in its second year. Established under a grant from the Ford Foundation, the program calls for the appointment each semester of a distinguished public servant to teach as a visiting professor in the Department of Government. Former U. S. Senator, the Honorable Ralph Flanders of Vermont was the first incumbent; he was followed by another former Senator, the Honorable Earle C. Clements of Kentucky. Appointed to succeed Senator Clements was Neil Staebler, former Chairman of the Democratic State Central Committee of Michigan. The Honorable Meade Alcorn of Connecticut, National Chairman of the Republican Party for a number of years, will serve in the program in the first semester of the academic year 1962–63.

Through its Department of Government, the University conducts another program designed as a specific means of attracting competent students into public service positions. The University, in conjunction with the Graduate School of Public Administration at Harvard and the departments of political science at the Massachusetts Institute of Technology and Boston University, maintains a cooperative internship program with the State Commission on Administration and Finance. Under grants provided by the Carnegie Corporation, carefully chosen graduate students spend two years in the program, the first year in offices of the state government and the second

pursuing graduate study at one of the four participating institutions. In 1961, five University students were undergoing intern training.

Mention has already been made of vital activities conducted by the Bureau of Government Research. Its contribution in depth to the democratic process in our cities and towns can be further documented in citing, for instance, the 27 seminars held for selectmen, planning boards and public works officials in a number of Massachusetts municipalities. In addition, the Bureau held conferences for city and town managers, highway personnel, public assistance officials, and assessors. Culmination of all this activity in 1961 was the annual Governor's Conference on State, County, and Municipal Relations. Through sharp discussion and exchange of information, this campus event indicated anew that a university is a deeply involved force for maintaining a free forum on topics of vital concern to all in a democratic community.

The University in 1961 held a highly successful Legislators' Day for Representatives and Senators of the Massachusetts General Court. Proceeding on the philosophy that a public university must always be ready to stand full inspection by the people and their representatives, we initiated the program for legislators with a day-long schedule of events on the campus in Amherst. Approximately 80 members of the General Court, led by the President of the Senate and the Speaker of the House, participated in the program along with students, faculty and staff from the University community. There is no question that greater mutual understanding was fostered as a result of Legislators' Day activities. The program will now become a regular part of the University calendar, and hopefully soon we will be hosts to the entire legislative body meeting under informal circumstances on a campus largely built by the far-sighted support of that body.

In 1961, too, plans were being considered for the eventual opening of other facilities having direct bearing on the democratic process and on general public improvement along a broad front. A major development along these lines was the establishment of the Population Research Institute jointly administered by the Department of Sociology and Anthropology and the Department of Agricultural and Food Economics in cooperation with the Massachusetts Extension Service and various other University units. The work of the Institute, directed toward supplying significant interpretations of Massachusetts population data, should be of great value in furthering the objectives of extension and regional development programs.

The campus — important setting for vital involvement in the democratic process.

TOWARD THE CENTENNIAL — AND GREATER FREEDOM TO SERVE

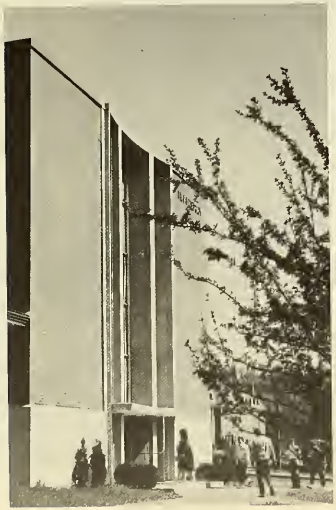
All of the developments discussed in the preceding pages are important to the real constituency the University serves — the people of the Commonwealth and hence the people of America. Our goals and objectives must be the goals and objectives of the larger community in which we find ourselves.

What has occurred in 1961 can therefore be seen as an approach to a new phase of University development. As the University observes its Centennial in the academic year 1962–63, it can look back with a sense of pride for the way it has given strong evidence of its ability to adapt to new conditions in a changing society.

But our Centennial will be dedicated to the future which the University can materially help to build — in the Commonwealth, in the nation, and in the world at large. This is not an exaggerated aim. What it means is that the University is not apart from the great community of public institutions that make the United States a pioneer in democratic education. The Land-Grant colleges and universities will thus work in concert in the great age ahead to establish new levels of dignity and hope for mankind at home and abroad.

A MODERN FACE FOR THE UNIVERSITY'S CENTENNIAL

Health Service



Student Union

Morrill Science Center

Machmer Hall

Public Health Center

School of Education

But to do this, each institution must have the freedom to serve. It must have sufficient authority granted to its governing body to permit a right assessment of national goals and a ready means of effecting the policies and programs needed to fulfill these goals.

In 1961 the University of Massachusetts was still hampered by controls laid upon it by centralized state agencies. Impediments continued to exist in the areas of personnel recruitment and retention, purchasing and printing, staff travel, and fiscal operations.

One of the greatest steps forward, however, was that made by the Special Commission on Budgetary Powers at the University of Massachusetts — a distinguished body of public and private members charged by the legislative leadership to report on the merits of granting greater self-management authority to the University's Board of Trustees.

Prior to the publication of this Report, the Commission made recommendations supporting the University in its effort to become equal to other state universities in fiscal organization and management responsibilities. The Commission recommendations, once enacted into law, would give the University the "authority commensurate with responsibility" that is needed to take on the major tasks awaiting us in and beyond the Centennial Year.

Given this authority and this responsibility, the University must and will become the chief public resource for greatness in the Commonwealth's educational program. The demands of the new age now upon us are far less matters for unreasonable concern than they are opportunities to achieve major gains in the improvement of people and institutions throughout the world. Education — free to do the job that must be done — is unquestionably the readiest and most effective instrument we have to turn the tide of history in the direction of lasting light and supreme accomplishment under conditions of peace. As the University of Massachusetts begins looking to its second hundred years, it takes this goal as its mandate.

John W. Lederle

President

May 1, 1962

where the operating dollar comes from . . .

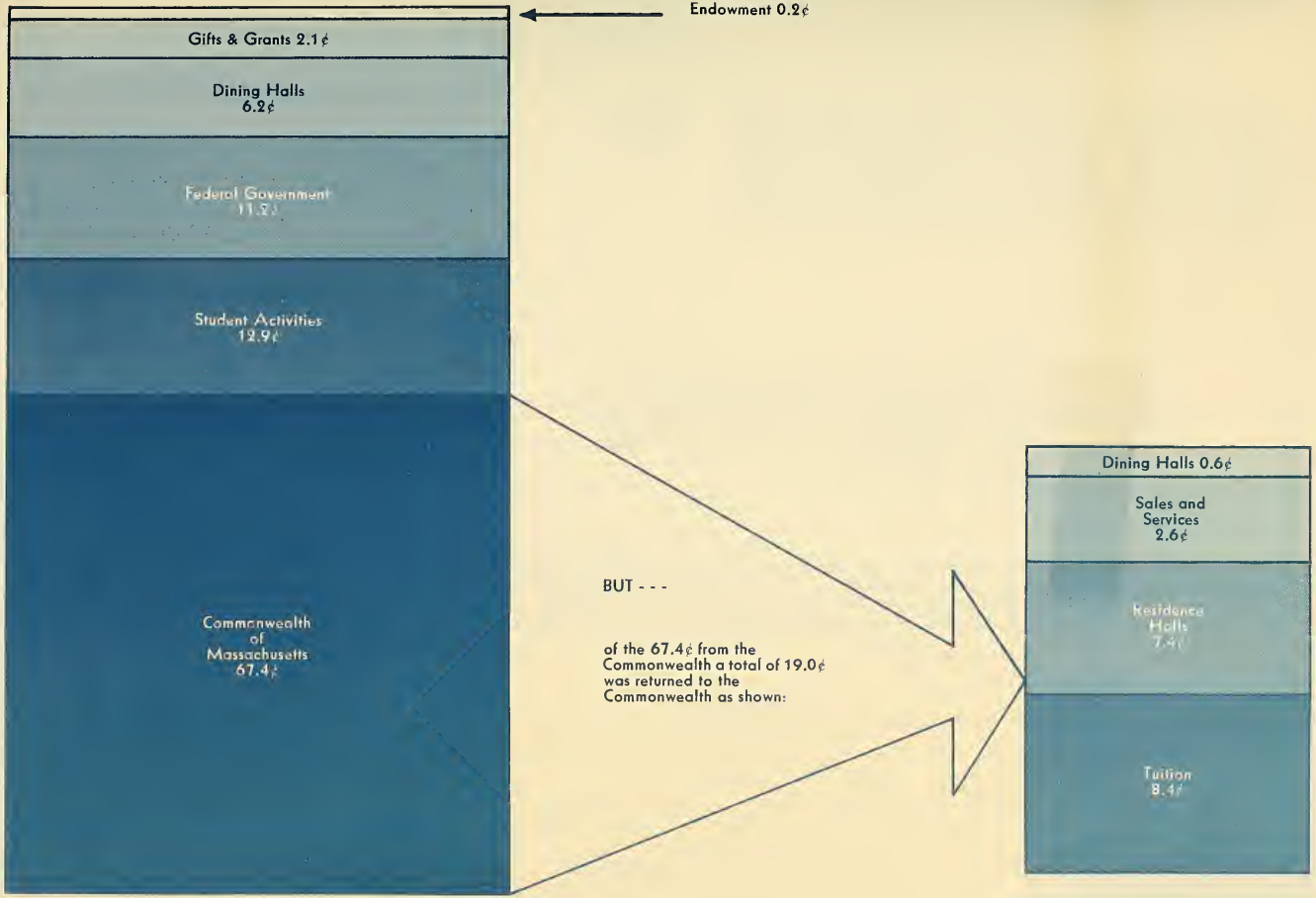
For the fiscal year 1961 the University received from all sources $15,304,266 for operating purposes. Of this, a total of $10,321,842 was appropriated by the Commonwealth, amounting to 67.4 cents out of each operating dollar.

However, the University returned to the State Treasurer, as required by the State Constitution, $2,920,676 representing collections for student tuition, board and room, and sundry sales and services. Thus, the net cost to the taxpayer was only $7,401,166 or 48.4 cents out of each operating dollar.

The following sources provided the balance of the operating dollar: Federal government 11.2 cents, student activities 12.9 cents, dining halls 6.2 cents, gifts and grants 2.1 cents, and endowment income 0.2 cent.

SOURCE	Totol Am't.	Percent of Totol
COMMONWEALTH OF MASSACHUSETTS:		
FUNDS PROVIDED BY UNIVERSITY RECEIPTS		
DINING HALLS	$ 88,672.08*	0.6
RESIDENCE HALLS	1,135,151.70	7.4
TUITION	1,292,400.03	8.4
SALES AND SERVICES	404,451.92	2.6
SUB-TOTAL	$ 2,920,675.73	19.0
NET FUNDS PROVIDED BY THE TAXPAYER	7,401,166.36	48.4
TOTAL	$10,321,842.09	67.4
FEDERAL GOVERNMENT	1,712,681.57	11.2
STUDENT ACTIVITIES	1,972,159.19	12.9
GIFTS AND GRANTS	319,075.86	2.1
AUXILIARY ENTERPRISES — DINING HALLS	953,887.30	6.2
ENDOWMENT INCOME	24,620.18	0.2
TOTAL RECEIPTS	$15,304,266.19	100.0

*DINING HALLS WERE OPERATED BY STATE APPROPRIATION FOR 3 MONTHS AND THEN TRANSFERRED TO TRUST FUNDS.


Endowment 0.2¢
Gifts & Grants 2.1¢
Dining Halls
6.2¢
Federal Government
11.2¢
Student Activities
12.9¢
Commonwealth
of
Massachusetts
67.4¢
BUT - - -
of the 67.4¢ from the
Commonwealth a total of 19.0¢
was returned to the
Commonwealth as shown:
Dining Halls 0.6¢
Sales and
Services
2.6¢
Residence
Halls
7.4¢
Tuition
8.4¢

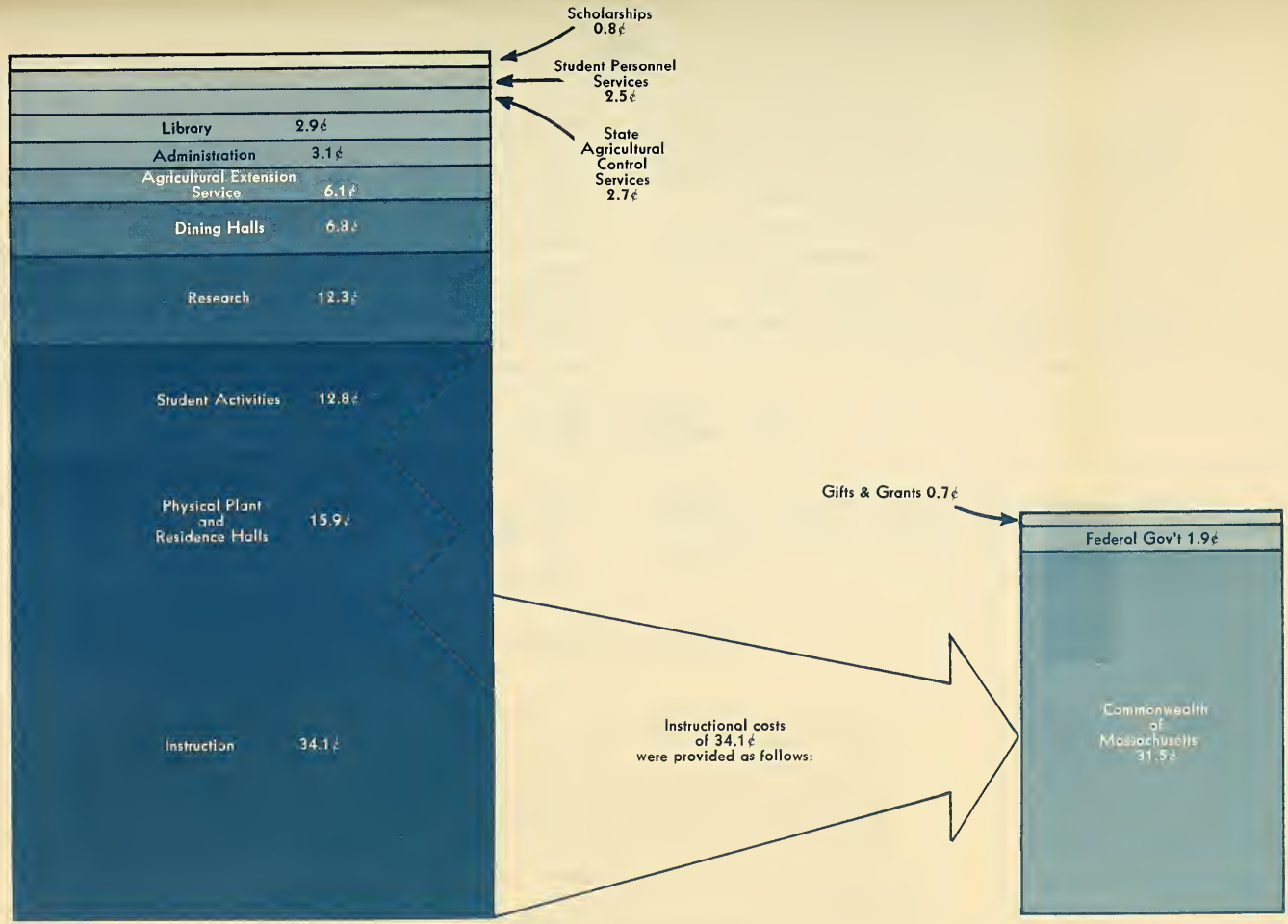
how it is spent . . .

Direct instructional costs naturally represented the largest single operating expenditure requiring $5,214,497 (or 34.1 cents of each dollar) out of total expenditures of $15,304,266. Research and library, expenditures closely related to instructional costs, required 12.3 and 2.9 respectively of the operating dollar. Agricultural extension services and state agricultural control services required 6.1 cents and 2.7 cents each.

FUNCTION	Total Am't.	Percent of Total
INSTRUCTION:		
STATE FUNDS	$ 4,823,578.57	31.5
FEDERAL FUNDS	295,306.80	1.9
GIFTS AND GRANTS	95,611.62	0.7
TOTAL INSTRUCTION	$ 5,214,496.99	34.1
LIBRARY	437,496.04	2.9
RESEARCH	1,884,912.59	12.3
AGRICULTURAL EXTENSION	938,933.30	6.1
STATE AGRICULTURAL CONTROL SERVICES	410,966.91	2.7
DINING HALLS	1,039,212.72	6.8
PHYSICAL PLANT AND RESIDENCE HALLS	2,434,124.30	15.9
ADMINISTRATION	473,478.74	3.1
STUDENT SERVICES	371,175.90	2.5
SCHOLARSHIPS	127,309.51	0.8
STUDENT ACTIVITIES	1,972,159.19	12.8
TOTAL DISBURSEMENTS	$15,304,266.19	100.0

Operating and maintenance of the physical plant and residence halls accounted for 15.9 cents of the dollar. Six and eight-tenths cents of every dollar went toward dining hall operations and 12.8 cents into student activities. The remainder of the operating dollar was expended as follows: administration 3.1 cents, student personnel services 2.5 cents, and scholarships 0.8 cent.

The box on the right shows that of the 34.1 cents spent for direct instructional costs, a total of 31.5 cents (93 per cent) was provided by state appropriations. The remainder — 2.6 cents (7 per cent) — was provided by the Federal government and from gifts and grants.


Scholarships
0.8¢
Student Personnel
Services
2.5¢
State
Agricultural
Control
Services
2.7¢
Library 2.9¢
Administration 3.1¢
Agricultural Extension
Service 6.1¢
Dining Halls 6.8¢
Research 12.3¢
Student Activities 12.8¢
Physical Plant
and
Residence Halls 15.9¢
Instruction 34.1¢
Gifts & Grants 0.7¢
Federal Gov't 1.9¢
Commonwealth
of
Massachusetts
31.5¢
Instructional costs
of 34.1¢
were provided as follows:

BOARD OF TRUSTEES

1961

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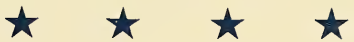

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LAND GRANT COLLEGES
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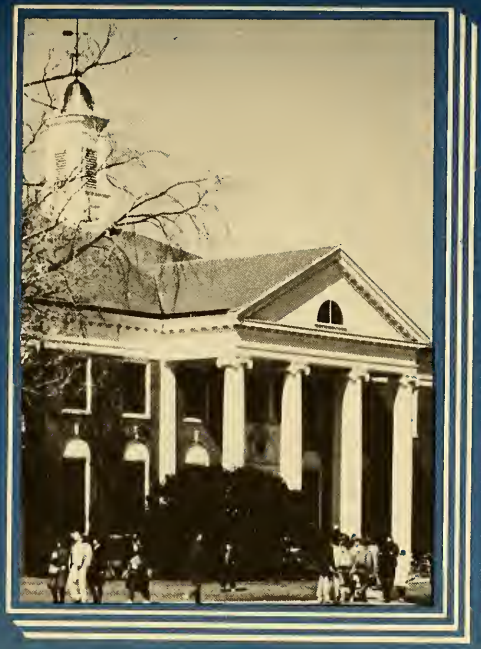

Adventure in Higher Learning

UNIVERSITY OF MASSACHUSETTS BULLETIN

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Adventure in Higher Learning

GENERAL INFORMATION BULLETIN

UNIVERSITY OF MASSACHUSETTS

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A WORD FROM THE PRESIDENT

IN the pages that follow, you will find the University of Massachusetts described as "a place to live, to work, to learn." The University is, in other words, not only a place — but an opportunity. And the emphasis is on people, on teachers and students, on the men and women who contribute to and make our society what it is.

The full resources of the University are therefore always at the disposal of our students, whom we regard as the most important resource of all. And certainly if the young people we accept are to live, work and learn *well*, then we must be sure that they are *interested* and *dedicated people*, who will profitably and effectively participate in all that the University has to offer.

This is important, for the University itself, now observing its 100th anniversary as a major public institution of higher learning, is committed to serving national objectives in one of the most challenging eras of world history. We therefore see our students as integrally involved in helping our society to grow and to contribute in all significant ways to fulfilling these objectives.

In the process, students can derive enjoyment and satisfaction in the largest measure. The University has rich opportunities both in its curricular and extracurricular activities. Those who wisely balance their programs, who place studies first and carefully select other activities, can experience the "connection between knowledge and the zest of life" that is reflected in the program of all true universities.

Cordially,

John W. Lederle

JOHN W. LEDERLE
PRESIDENT

THE UNIVERSITY AND ITS CAMPUS

THE University of Massachusetts is the state university of the Commonwealth, founded in 1863 under provisions of the Morrill Land Grant Act passed by the United States Congress one year earlier.

Now observing its Centennial, the University is a member of the great community of Land Grant colleges and state universities serving the nation as principal resources of higher education for the country's citizenry. Incorporated as the Massachusetts Agricultural College in April, 1863, the institution was opened to a handful of students in 1867. Rooted in the liberal arts tradition (its early presidents were graduates of such colleges as Dartmouth, Williams, Amherst, and Harvard), it has grown steadily from the four teachers and four wooden buildings available for its opening session. Reflecting the broadening interests of its students, the General Court of the Commonwealth of Massachusetts authorized a second name, Massachusetts State College, in April, 1931. Sixteen years later, in May, 1947, the institution became the University of Massachusetts.

Situated in one of the most picturesque sections of the state, the University joins with its academic neighbors—Amherst, Smith, and Mount Holyoke Colleges—in maintaining the rich tradition of educational and cultural activity associated with this beautiful Connecticut Valley region. The University's campus consists of approximately 750 acres of land and 90 buildings. These structures—including classroom and laboratory facilities as well as dormitories and other units—extend in a great circle around the Campus Pond. This arrangement helps in maintaining the University as a community in which the individual holds central importance.

The community itself is located in a region that offers outstanding opportunities for a student's cultural development. Art exhibits, dramatic productions, concerts, and other activities in the Four College area are fully available to all students. In addition, the University maintains excellent recreational facilities as well as intercollegiate and intramural sports activities. The total program is dedicated to giving every student a chance to develop all of his capabilities under the best possible conditions. As the University moves into its second century, this will continue to be its prime objective.

Busy morning scene in the central quadrangle.

Autumnal setting near the Student Union.

ADMISSION - - HOW TO GET READY

Applications for admission may be obtained by writing the Registrar of the University. Candidates are advised to file their applications early in the senior year and certainly not later than March 1 of the year they plan to enter.

Qualified applicants are admitted at the beginning of the fall and spring semesters and at the beginning of the ten weeks summer session. Since there are many more qualified applicants than can be admitted, however, preference has to be given to those with the highest ratings.

All applicants for admission except veterans and candidates for the Bachelor of Vocational Agriculture degree must take the Scholastic Aptitude Test given by the College Entrance Examination Board. In addition, the University reserves the right to require three Achievement Tests administered by the same Board if the applicant's scholastic record includes several subjects below the college recommending grade of the school. Each applicant will be informed of the procedure he must follow at the time his application is acknowledged.

METHODS

A. *High School Seniors*

High school seniors are advised to file their applications early in the senior year. The Scholastic Aptitude Test may be taken on any of the scheduled dates. The January date is recommended except for those applying for early acceptance. The May date is usually too late for seniors, but is appropriate for juniors taking the test for guidance purposes.

Some applicants have a definite first preference for the University and have records that deserve early consideration. Such applicants will be accepted early in their senior year under the following conditions. They must be taking the usual college preparatory course in high school and maintaining the college recommending grade of the school in all of their courses. They must take the College Board Scholastic Aptitude Test in the junior year, preferably in May, and make a score satisfactory to the University. They must indicate the University as their first preference.

Under these conditions the University will be glad to accept such students as indication of excellent achievement in high school and to reduce some of the anxiety that an applicant feels during the senior year while waiting for action usually taken in the spring. In this way, too, the burden of multiple applications on high school principals and college admissions officers may be lessened.

B. *High Ranking High School Juniors*

Applicants who have completed with very high academic standing work through the junior year may be admitted to the University for the semester following the junior year. Such applicants must take the Scholastic Aptitude and three achievement tests given by the College Board in May of the junior year and make scores satisfactory to the University. They must be highly recommended by their high school principal. The maturity and social adjustment of the applicant will be considered along with his intellectual development. Such applicants should apply before the end of the junior year.

C. *Veterans*

Veterans are not required to take the Scholastic Aptitude Test. Instead, they must take entrance examinations in algebra, English and a College Qualification Test. These are administered by the University Testing Service in January, June and August. Information in regard to these tests will be furnished the veteran at the time he files his application for admission. "Six Months Active Duty for Training" students are not considered veterans. They must take the College Board Scholastic Aptitude Test rather than the Veterans' Examinations.

D. *Bachelor of Vocational Agriculture Degree*

Superior graduates of vocational schools of agriculture in Massachusetts and vocational agricultural departments in Massachusetts high schools may be accepted for the Degree of Bachelor of Vocational Agriculture, provided:

a. They are unqualifiedly recommended by the Vocational Division of the Department of Education as *bona fide* Vocational Graduates with superior ranks; and

b. They can present at least 16 units of certified entrance credits, approved as to quality and quantity by the State Department of Vocational Education; and

c. They successfully pass the English and College Qualification Test administered by the University Guidance Office. Those who have had algebra will be required to include the algebra examination.

E. *Transfer*

A limited number of transfers from approved colleges may be admitted. Since applicants for such transfer exceed the number that can be admitted, they are placed on a competitive basis. Ratings will be based upon high school and college records and on the College Board Scholastic Aptitude Test, which is required of all transfers. The University reserves the right

to require the College Board Achievement Tests also, if the applicant's records make this advisable. Information in regard to transfer may be obtained by writing the Registrar.

At least 45 semester credits taken in residence at the University are required of all transfers who are candidates for the Bachelor's Degree.

SUBJECT REQUIREMENTS

The subjects of preparatory study required for admission call for the satisfactory completion of a four-year high school course or its equivalent and are stated in terms of units. A unit is the equivalent of at least four recitations a week for a school year. High school graduation alone is not sufficient. The applicant's record must indicate capacity for handling the quality of scholastic work which the University has established as its standard of achievement.

Sixteen units of secondary school work must be offered, selected according to the following requirements:

College Preparatory Mathematics	3*
English	4
Foreign Language (2 years of 1 language)	2
U. S. History	1
Laboratory Science	1

The remaining units are elective and may be selected from the following subject matter:

a. Mathematics
b. Science
c. Foreign Language
d. History and Social Studies
e. Free electives (not more than four units)

Free elective subjects are those not included in groups a–d, as for example: Music, art, drawing, typewriting, aeronautics, agriculture, home economics, etc. Such free electives are allowed in order that the student who wishes may have some opportunity to elect other high school offerings, while at the same time covering the fundamental requirements for college work.

Students planning to major in the physical sciences and mathematics should, if possible, offer two years of algebra, one of plane geometry, and one-half year of trigonometry. Analytical or solid geometry, chemistry, and physics, and an introduction to analytical geometry and calculus are also strongly recommended.

*Preferably two years of Algebra and one of Plane Geometry.

Students planning to pursue an engineering curriculum should offer two years of algebra, one of plane geometry, and one-half year each of trigonometry and solid geometry. Chemistry and physics are also advised. Those deficient in the mathematics should plan to cover it during the summer prior to entrance or expect to take five years to complete the college course.

Candidates of exceptional ability and promise may be considered for admission even though some of the prescribed courses were not included in their high school program.

COLLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT

Successful completion in secondary school of courses approved by the College Entrance Examination Board Advanced Placement Program, or the equivalent as approved by the University, will be regarded as meeting the equivalent requirement and will be accorded credit toward graduation.

PHYSICAL EXAMINATION

Physical examination by their local doctor is required of all entering freshmen, re-entering students and all students participating in athletics. Physical report forms for this examination will be mailed to each student with the bill for the first semester and must be completed and returned to the University Health Service 10 days before the opening of the semester. Evidence of a *successful* smallpox vaccination is required.

VETERANS' AFFAIRS

The Veterans' Coordinator is a staff member of the Placement and Financial Aid Services. All veterans affairs should clear through the Placement and Financial Aid Services.

Veterans and eligible dependents of veterans who are entering the University for the first time must present a Certificate of Eligibility at registration. This may be obtained from your nearest Veterans Administration office. Board and room fees must be paid in advance whether the veteran is enrolled under the G.I. Bill or not.

Veterans who are transferring to the University of Massachusetts from another institution or who have done summer work at another institution will be required to submit a supplemental Certificate of Eligibility at registration. This may be obtained by applying through the veterans' office at the institution last attended.

WHAT IT COSTS TO ATTEND

Expenses vary from approximately $1,150 to $1,300 per year for the normally economical student. First year costs are usually greater than those of the other three years and there is less opportunity for earnings. Therefore, a student is advised to have a definite plan for meeting the expenses of the first year before entering.

The following estimate of a year's expenses, based chiefly upon last year's costs, includes only those items which are strictly college and does not include amounts for clothing, laundry, travel, etc. These costs vary slightly from year to year. Tuition for residents of Massachusetts is $200 per year and for others $600.

	Normal
Tuition (citizens of Massachusetts)	$ 200.00
Room in college dormitory or private home (approx.)	300.00
Board at college dining halls (approx.)	420.00*
Athletic Fee	30.00
Student Union Fee	20.00
Student Activity Tax (approx.)	28.00
Student Health Services Fee	30.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Books, stationery, and other supplies (estimate)	100.00
	$1,144.00

INITIAL PAYMENT FOR FRESHMEN

The initial payment for first semester expenses required of freshmen at the time of fall registration is indicated below and is made up of the following items:

Tuition (citizens of Massachusetts)	$ 100.00
Room rent in college dormitories (approx.)	150.00
Board at college dining halls (approx.)	210.00*
Athletic Fee	15.00
Student Union Fee	10.00
Student Activity Tax (approx.)	14.00
Student Health Services Fee	15.00
Student Medical/Surgical Insurance, 12 months' coverage (optional)	16.00
Military uniform deposit (men only)	30.00
Physical Education Equipment Fee (men only)	10.00
Books, stationery, and other supplies	100.00
	$ 670.00

*Above plan for 7 days; 5-day plan available for approximately $340.00 per year or $170.00 per semester.

These are only approximate figures. A bill will be rendered to the parent of each student prior to the beginning of the semester.

TUITION

As a state institution the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

A student must present evidence satisfactory to the Treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a "bona fide" residence in the Commonwealth with the intention of continuing to maintain it as such.

The domicile of a minor shall follow that of the parents unless such minor has been emancipated. In case of emancipation the student, in addition to the requirements of these regulations, respecting residence, shall present satisfactory proof respecting emancipation. Minors under guardianship shall be required to present, in addition to the certification of the domicile of the guardian, satisfactory documentary evidence of the appointment of the guardian. No student shall be considered to have gained residence by reason of his attendance in the University nor shall a student lose residential preference during his continuous attendance at the University. The residence of a wife shall follow that of the husband.

The prescribed form of application for classification as to residence status must be executed by each student. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University. Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University. Students receiving credit by special examination must pay $5.00 per credit to be received before the examination may be taken.

ROOM AND BOARD

The University provides accommodations in dormitories for a large number of its students. Freshmen, sophomores and juniors, unless 21 years of age, are required to live in University dormitories unless excused by the Dean's office. The University provides three dining halls for students at Butterfield House, Greenough House and University Dining Commons. The dining halls at Butterfield and Greenough dormitories are intended primarily to provide for students housed in that area, including residents of Chadbourne, Mills and Brooks Houses. All freshmen, sophomores and juniors residing in University dormitories will be required to board at University dining halls, except that such students who are members of fraternities or sororities may be permitted to board at their respective fraternities or

sororities. Any student who wishes may board at University dining halls on the ticket plan or cash basis.

SUMMER ORIENTATION FEE

Members of the incoming freshman class attending the summer orientation program will pay a non-refundable fee of $15.00 to cover the cost of meals, housing, testing and counseling.

PAYMENT DUE DATES

In accordance with University policy, all charges for tuition, fees, board and room rent in University dormitories are due and payable twenty-one days prior to the date of registration of each semester. Bills will be rendered in advance and payment may best be made by mail. Students may not register until all University charges are paid.

A WORD ABOUT FINANCIAL AID

Scholarships, loans, and part-time employment are available for a limited number of needy and deserving students. Scholarships are awarded only to needy students of high character whose habits are economical and whose scholastic records are satisfactory. A limited number of such grants are available to entering freshmen who have made outstanding records in high school. Students may also apply for certain kinds of loans, including those available under the National Defense Student Loan Program, University loans (after the first semester of the freshman year), and the Higher Education Loan Plan (at the end of the freshman year). Also, students may engage in part-time work after the completion of the first semester of their freshman year. Information about each of these programs may be obtained by writing to the Director of Placement and Financial Aid Services. Veterans or dependents of veterans who are eligible for benefits may also apply to this office for information.

A PLACE TO LIVE, TO WORK, TO LEARN

HOW can I make the most of my college career? Every student asks this question just before the start of his freshman year. Specific answers usually wait until the student is actually in college where teachers and advisers help him to decide on the major course of study he should pursue. Often, of course, a student has already made a decision about his "major," and if the decision is based on a sound assessment of aptitudes and abilities, this is all to the good.

But even for students who are sure about what they want to "take" in college, the question is still very important. The danger in approaching college work lies in the assumption that this is, as with many other activities, "just a routine." As a student reads the general catalogue, he finds rules, regulations, requirements, and prescribed courses of study. All these tend to make him feel that the curriculum is indeed just a routine for getting enough credits to graduate.

For many students this is certainly true. But for the wise student, the word "routine" is supplanted by the word "adventure." The rules, regulations and requirements are not thereby eliminated, for every college must have the means of order and stability by which to achieve basic objectives. But the good student recognizes that he need not work merely to satisfy *minimal* requirements: he can do much more. If he learns early that thought is not locked within the four walls of a classroom, if he is alive with interest, if he realizes that his four years in college will be the best he will ever have for stocking his mind and exercising his imagination, then his "prescribed course of study" will become a springboard to a fascinating realm of knowledge and ideas that only he himself can attain.

The following paragraphs, therefore, are simply intended to show what the University can offer a student, what it requires of him, and what he must do to fulfill these minimal obligations. Beyond these basic offerings and requirements lies the real adventure—the adventure in learning.

A YEAR-ROUND OPERATION

The University conducts its program on virtually a year-round basis. The regular two semesters of the academic schedule are supplemented by a two-term summer session in which a student can earn nearly the equivalent of a full semester's work. Combining the work of the regular academic year with a complete schedule of courses in the summer sessions, students can finish their college careers in three years instead of four. The summer session is open to all freshmen who wish to begin their college education immediately following graduation from high school. It is also available to high school juniors who are accepted for study at the University under the Early Admission Plan (see below under Program for Superior Students).

THE ACADEMIC PROGRAM

The University consists of two main divisions, the four-year undergraduate curriculum and the Graduate School. Instruction in the undergraduate program is assigned to the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, and Physical Education, and the Department of Public Health. A qualified student may enter any one of these units and

work toward the appropriate bachelor's degree, as described on Page 11. The total program is built around a core of studies designed to provide a sound general background. Beyond this, the student elects a program within a particular branch of learning in order to prepare for advanced study in that field or for a career in one of the professions. Offerings in the various branches range from accounting to zoology, and a student electing any major course of study has opportunities for a comprehensive education in the four-year program. Descriptions of the courses of study offered in each of the undergraduate branches can be found in the section beginning on Page 12.

THE PRELIMINARIES: FRESHMAN ORIENTATION

All students entering as freshmen must attend a two-and-a-half-day orientation program at a specified time during the summer prior to entrance. The program consists of testing, counseling, and pre-registration for courses to be taken during the coming semester. Guidance and placement tests are given and scored, and each student is assigned a faculty adviser who will help in the selection of courses and planning of a class schedule. On the final day of each of these periods, a special program is held for parents so that they may learn about the student's proposed courses and schedule for the fall semester, the results of the testing sessions, and the facilities and opportunities available at the University.

GENERAL UNIVERSITY SERVICES

The University is a community of individuals working toward a common goal—the acquisition and dissemination of knowledge. As a community, therefore, the institution has all of the adjunct resources needed to further that goal and to provide for the general well-being of the community's members.

Thus, the University maintains an extensive library system, both through the University Library and the 30 departmental and laboratory libraries. In addition, the University is a participating member in the Hampshire Inter-Library Center, housed at the University and containing journals, documents and reference sets for use in study and research. The Center is jointly operated by Amherst, Smith, and Mount Holyoke Colleges and the University under the Four College Cooperation Program engaged in by the four area institutions.

Concerned as it is with the need for spiritual undergirdings for the educated man, the University gives support to the religious life of its students in various ways. It affords the use of facilities for student groups of all faiths, and it honors the work of the Campus Religious Council which provides a cooperative interrelationship among religious groups. Chaplains are assigned to campus by the various faiths, and students are urged to meet with their own chaplain upon coming to the campus.

The University's Health Service, housed in one of the newest buildings on campus, is concerned with the total health of individuals and groups, as reflected in the need for complete physical, mental and social well-being. The new infirmary contains a fully-equipped out-patient department, X-ray and laboratory resources, and physiotherapy facilities. The Health Service staff of physicians, technicians and nurses is devoted to promoting good physical and mental health, conditions of safety, and other factors affecting the health of students in the campus community. In addition, the University maintains a Speech and Hearing Center to assist students and others with speech and hearing problems.

GRADING SYSTEM

Enrollment in and graduation from the University involve both quality and quantity of work. The quantity of work is measured by the credits obtained by successful completion of courses. The quality of work is measured by grades. Each grade is equated with a quality point as noted below. The quality point average required for continued enrollment and for graduation is set by the Faculty Senate. At present the graduation requirement is a cumulative average of 1.80.

Grades are reported according to a letter system, as follows: A—Excellent, B—Good, C—Average, D—Passing (but not satisfactory), F—Failure, and Inc.—Incomplete. Quality points per semester hour are assigned as follows: A, 4; B, 3; C, 2; D, 1; and F, 0. To compute the semester grade point average, as well as the cumulative average, the total points earned are divided by the total credits carried. Any student whose semester quality point average falls below the cumulative requirement is warned of his status by the Registrar and informed of the rules governing dismissal. Students who achieve high averages are placed in one of three honors groups each semester, as follows: First Honors: 3.8 or higher; Second Honors: 3.4 to 3.7 inclusive; and Third Honors: 3.0 to 3.3 inclusive.

ADVISORY SYSTEM

In order that, from the day he enrolls, the freshman may have someone to whom he may go for consultation and assistance, each student selects a tentative educational objective and is assigned a faculty adviser within that academic area.

In the second semester of the freshman year, each student is given an opportunity to change to a new department or to remain in his current department. In succeeding semesters, students may change to another major department by execution of a Program Change Card (available in the Registrar's Office). It is the function of this adviser to help the student in adjusting himself to the work and life of the University. Academic progress reports issued by the Registrar's Office are sent to the advisers periodically, and the students are expected to report to their advisers from time to time to discuss

their academic standing. The University also forwards reports of academic standing to the parents. Both students and parents are encouraged to consult with the adviser whenever there are problems regarding studies or personal adjustments to college life.

PROGRAMS FOR SUPERIOR STUDENTS

The University regularly provides superior students with challenging educational programs extending from the freshman through the senior year. Under the Early Admission Plan, the University considers applications from students of high standing who have completed their junior year of secondary school.

Many entering students are able to achieve advanced standing and credit for college-level courses successfully completed in their secondary schools as part of the College Entrance Examination Board Advanced Placement Program or an equivalent. The University also administers a number of its own advanced placement tests. A student who demonstrates he is proficient in a basic college subject may by-pass the beginning course and go on to advanced work in the subject. Upon attaining satisfactory standing in many of these courses, students are granted academic credit for the courses by-passed. Also, up to thirty semester hours of credit may be granted students of high standing who can fulfill the requirements of some of their courses through independent study.

The major feature of the program for superior students is the honors curriculum available to all who qualify. Freshmen are eligible for the Honors Colloquium program conducted for the first three undergraduate classes.

The Senior Honors Program recognizes merit and gives highly qualified students time and opportunity for independent study under closer, more personal direction than is ordinarily provided in the University curriculum. Students who complete their work satisfactorily are eligible for graduation with honors.

STUDENT HOUSING

It is the policy of the Board of Trustees that all men and women undergraduate students shall be housed in campus dormitories and be required to eat at University dining halls unless given permission to commute from their parents' home or to live at sorority or fraternity houses. University board is optional for seniors and is available on a cash basis. Sororities and fraternities may furnish regular board to members up to the approved capacity for each house. Students who are assigned to housing operated by the University are expected to remain for the academic year and may not be released sooner except as their places are taken by suitable substitutes. The University reserves the right to change room assignments whenever necessary.

Most dormitory rooms are double and are furnished with beds, mattresses, desks, chairs, and a chest of drawers. Students care for their own rooms and are responsible for any damage. Dormitories open for occupancy on the day immediately preceding the opening of the University. All student property must be removed from the rooms and the key turned in immediately after final examinations in June. Such property not removed by the owner will be removed by the University and stored at the owner's expense. Students assigned to dormitory rooms will be responsible for the room rent of the entire semester. Room rent is not refundable. Room rental charges do not include the several regular school vacation periods. The University reserves the right to utilize student rooms during vacations for conferences and other groups which meet occasionally on the campus.

APARTMENTS FOR MARRIED STUDENTS

The University owns and operates two groups of apartments: Lincoln Apartments for junior faculty, married graduate and undergraduate students, and the County Circle apartments for married graduate and undergraduate students. Apartments are unfurnished with the exception of kitchen units which contain an electric range and refrigerator. Apartments are assigned as of date of availability. New junior faculty, married graduate students and undergraduate students with children receive consideration in that order. Further information and applications may be obtained from the University Housing Office, Draper Hall.

AUTOMOBILES

Only members of the senior class, students 21 years or over, and commuters are permitted to have automobiles or other types of automotive equipment on the campus or in the Town of Amherst. Vehicles must be registered with the Campus Police. Driving to and from classes is not permitted. Exceptions may be made in the case of an individual who has a severe physical limitation. Requests for such exceptions must be made through the University Health Service.

STUDENT ORGANIZATIONS

Participation in extra-curricular activities offers opportunities for furthering the broader objectives of a college experience. The knowledge, skills and judgment developed in the classroom can be tested and refined through use in the organizational setting. Thus, more than fifty professional clubs exist on campus as a means of stimulating vocational interest through close contact with members of the teaching staff and representatives of the professions. Student government offers a forum for debate on matters of importance to the entire University community. For those interested in communications, there are several campus publications as well as an FM radio station. Experience in music and drama is available in a number of forms.

Such activities can be a profitable means of fostering maturity and general enrichment in those students who wish to take optimum advantage of all that the University can offer. In encouraging participation in these activities, the University asks only that students plan their time well, in order that they may profit as much as possible from a total University program devoted, first and foremost, to academic studies.

All extra-curricular activities are supervised by the Committee on Recognized Student Organizations composed of alumni, faculty, and students. Recognition for outstanding achievement in this area is given at an annual Student Leaders Night held in the spring. An office devoted to administering and assisting in the conduct of student activities is located in the Student Union. Detailed information about student organizations may be obtained by contacting the Recognized Student Organizations Adviser.

INTERCOLLEGIATE AND INTRAMURAL ATHLETICS

The University maintains well-organized intercollegiate and intramural sports programs. In intercollegiate athletics, the University is represented by teams in all the leading sports, including football, soccer, cross-country, basketball, swimming, wrestling, indoor and outdoor track, hockey, rifle and pistol, baseball, tennis, golf, lacrosse, gymnastics, skiing.

The University also supports a broad program of intramural activities, in which all students are encouraged to participate. The range of sports available each year includes the team sports of touch football, basketball, softball, volleyball. Individual activities include tennis, bowling, badminton and golf.

PLACEMENT SERVICES

The University maintains an Office of Placement and Financial Aid Services whose responsibilities include vocational and financial counseling and the administration of the affairs involved in aiding students to seek appropriate positions and careers; the granting of loans and scholarships; the assignment of part-time work; the coordination of veterans' affairs; and the dissemination of information relative to military service through the draft or reserves. While providing vocational and career counseling for all undergraduates, the emphasis is on aid to seniors in planning their future following graduation and providing them with job-hunting techniques and other media for finding permanent employment. Actual contact with employers is provided during the year when employers from business, industry, schools, and other sources visit the campus to interview prospective graduates.

Cumulative student personnel records; occupational information and industrial literature libraries; preparation of credentials including personal resumes and recommendations coupled with counseling and guidance are provided to enable senior men and women to accomplish their career objectives consistent with their interests, abilities, aptitudes and education.

THE PROGRAM AND ITS OPPORTUNITIES

The University offers four-year undergraduate curricula leading to the following degrees: Bachelor of Science, Bachelor of Arts, Bachelor of Science in Chemical, Civil, Electrical, Industrial and Mechanical Engineering, and Bachelor of Business Administration. Work toward these degrees is carried on in the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, and Physical Education, and the Department of Public Health. Special arrangements are made for some graduates of county agricultural schools and of agricultural departments of certain high schools to complete the college course with majors in agriculture and horticulture. Upon completion of their course, these students are granted the degree of Bachelor of Vocational Agriculture.

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The aim of the four-year course is to give the student as high a degree of proficiency in a particular branch of learning as is possible without sacrificing the breadth, knowledge and general training which should characterize a well-rounded college education. Under this philosophy, the University has made recognized contributions, through its graduates, to the life and culture of America. University alumni hold positions in government, education, business, science and engineering, the arts, medicine, law, and many other professions. With rising enrollments, the University is educating ever greater numbers of young men and women for significant careers and important contributions to American society.

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The following pages are designed to give some indication of the variety of such opportunities open to students who are accepted for admission. Descriptions of curricula are given in brief and general terms so that prospective applicants may become quickly acquainted with the entire range of offerings. Graduation requirements for each curriculum have been omitted, principally because a student admitted to the University will have ample opportunity to acquaint himself with such requirements after he has arrived on campus. Courses required in the freshman year, on the other hand, are included in the section beginning on Page 29. Further information on various phases of the major courses of study may be obtained from the Deans of the Colleges and Schools or from the Registrar. Information about other aspects of the University program may be obtained from the appropriate offices listed on Page 32.

COLLEGE OF ARTS AND SCIENCES

I. Moyer Hunsberger, *Dean*
Bartlett Hall

The College of Arts and Sciences offers instruction in the fine arts, the humanities, the social sciences, the natural sciences, and mathematics both for students enrolled in the College and for those in other undergraduate divisions of the University. The program provides for the breadth of intellectual development essential to a liberal education and for concentration which is the necessary foundation for competence in a selected discipline.

The Bachelor of Arts degree may be earned by students majoring in any division of the College. The Bachelor of Science degree may be earned by students in the natural sciences, mathematics, or psychology.

The following major courses of study are available in the College:

ART. The Department of Art is interested in providing two kinds of training: first, to give each student a good general historical and aesthetic knowledge of the arts; second, to give each student an opportunity to develop his creative ability in the several media of the arts.

ASTRONOMY. A Department of Astronomy conducted jointly with Amherst, Mount Holyoke, and Smith Colleges provides instruction in this field. All advanced courses are given on a joint basis for students from the four participating institutions.

BOTANY. Programs in botany prepare students for teaching and research in biological sciences in high schools, universities, industry, and experimental stations.

CHEMISTRY. The prime purpose of the Department of Chemistry is to offer sound preparation for graduate study in chemistry. Accordingly, emphasis is placed upon intellectual accomplishment and broad understanding rather than on terminal training for specific chemical tasks. The program designed for this purpose also affords sound preparation for direct entry into chemical industry, chemical institutes, or governmental laboratories.

ECONOMICS. In economics the aims are twofold: (1) to give the student an understanding of economic theory and of the application of economic principles to the organization of society; (2) to provide students with the elementary training necessary for further study and solution of economic and business problems.

ENGLISH. The major in English affords the student opportunities to improve his knowledge of the English language and his ability to use it clearly, logically, and artistically; to increase his knowledge of Western literature written in English or translated with distinction into English; to read and discuss a literary work with perception and understanding, and to form an independent estimate of it by valid critical standards.

GEOLOGY. For students considering geology as a career, the opportunities are many. Those interested primarily in basic science may look to positions

in teaching, in museum work, on state and federal surveys, and in various research organizations. Those concerned mainly with applied science may direct their efforts toward work in mining geology, petroleum geology, engineering geology, and ground-water geology, and industrial mineralogy.

GERMAN. The courses in German are intended to give a practical knowledge of the language for the purpose of wider reading, research, and oral communication.

GOVERNMENT. The courses offered by the Department of Government are designed to aid the student in gaining a knowledge of the nature, functions, and problems of government, and of the place of government in the modern world. Political theory, constitutional law, international relations, comparative government, politics and public administration are the principal areas covered.

HISTORY. Courses in history are designed to provide an understanding of man through a study of patterns of development in the past. The study should also give the student an introduction to major problems in world affairs.

JOURNALISM. The journalism program is concerned with (1) the study of writing and of communication problems relevant to the media of mass communication, and (2) the best utilization of the University's liberal education resources by students who plan careers in newspaper work, communications research, public relations, magazine and radio journalism, or some other field of communications.

MATHEMATICS. The department offers courses designed to furnish a cultural background as well as a foundation for both undergraduate and graduate work in such fields of science as physics and chemistry, in engineering and in other technical subjects.

MICROBIOLOGY. The courses in microbiology are designed to aid the student in acquiring special knowledge of the nature and function of the microbes and to provide an appreciation of the role of experimental biological science in widening man's horizons.

MUSIC. The undergraduate major program in music is pre-professional, so that courses, music organizations, and private study are the means used to prepare each student. Other undergraduates may minor in music, or follow a sequence of courses for continuing study.

PHILOSOPHY. Philosophy seeks a comprehensive understanding of the various areas of man's experience in their interrelatedness. In the context of the historically important theories, the courses concentrate on methods of inquiry into the persisting questions of philosophy, standards of thought, clarification of ethical and aesthetic values, and the basis of criticism.

PHYSICS. Courses are designed to accommodate students who desire specialized training in physics, and also to provide required or elected courses for students majoring in engineering, mathematics, chemistry, or other fields.

PRE-MEDICAL AND PRE-DENTAL CURRICULUM. Pre-medical and pre-dental students are assigned to faculty advisers for their freshman year. At the end of their second semester, they will be assigned to a member of the Upperclass Committee who will be their adviser for the remainder of the course of study. Pre-veterinary students may register in the College of Agriculture or College of Arts and Sciences.

PSYCHOLOGY. The courses in the Psychology Department are planned (1) to impart an understanding of the basic principles, methods and data of psychology as a science and the application of this knowledge to problems of human adjustment; (2) to prepare some majors for graduate study which may lead to a professional career in psychology; and (3) to help prepare others for non-professional careers. In carrying out these aims, majors are urged to elect, with the help of a departmental adviser, a broad program of courses.

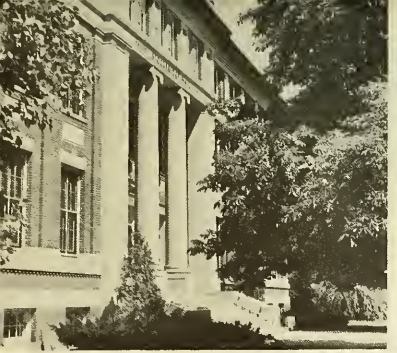
ROMANCE LANGUAGES. Two majors are offered: French and Spanish. The courses of these curricula are intended to give (1) a thorough training in the language skills, (2) an appreciation of the aesthetic and intellectual qualities of the literatures, and (3) a serious insight into the cultures of the nations concerned. Courses in Portuguese, as well as offerings in Latin and Greek, are also available at the University.

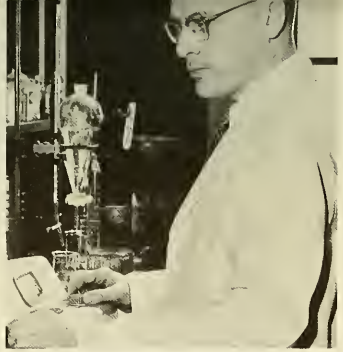
RUSSIAN. Students choosing Russian as their field of major concentration will receive training in reading, writing, speaking and understanding the language, and a knowledge of Russian literature. Russian majors will also acquire the background in Russian history, government and economy necessary for an understanding of the literature and culture of the Russian people.

SOCIOLOGY AND ANTHROPOLOGY. The courses in sociology and anthropology are planned with two aims in view: to give the student an understanding of the factors which influence men in their activities and interests as members of society, and to help prepare students for a wide variety of occupational outlets, including social work.

SPEECH. An undergraduate major in speech may be earned by completing thirty semester hours of course work in the department although nine of these may be earned in English and philosophy. Psychology 26 should be elected as a basic requirement. The student must select an area of concentration in (1) Rhetoric and Public Address, (2) Interpretation and Theatre, (3) Radio and Television, (4) Speech Education, (5) Speech and Hearing Therapy.

ZOOLOGY. The courses in zoology have two major aims: (1) to offer students an opportunity to develop an understanding and appreciation of the scientific method as a part of a liberal education; and (2) to provide training for prospective graduate students in biology, medicine, dentistry, and related fields, as well as future teachers and laboratory technicians in the biological sciences.





COLLEGE OF AGRICULTURE

Arless A. Spielman, *Dean*
Stockbridge Hall

The College of Agriculture offers a broad general education with specific training in a specialized area. Upon the completion of the requirements for graduation, the student will have devoted about one-quarter of his time to pure science, one-quarter to social and humanistic studies, and about one-half to applied science and technology. A broad choice of electives within the required courses of each curriculum gives the student the opportunity to prepare for a career in research, industry, business, education, conservation, services, or farming. Each department of the College has specific requirements for graduation which are included in the General Catalog under the name of the department. During the first semester of the freshman year, students interested in teaching vocational agriculture, extension work, or specializing in research work, should consult with the head of the department in which they plan to major.

For those students interested in a two-year program in food and agricultural industries, the University provides offerings in the Stockbridge School. A separate bulletin describes these offerings in detail.

The four-year courses of study available in the College of Agriculture include the following:

AGRICULTURAL BUSINESS. This curriculum is designed (1) to prepare students for employment in executive positions with firms related to agriculture or for administrative positions with governmental agencies concerned with agriculture and (2) to give the essential undergraduate preparation for a career in agricultural economics, in research, teaching, or extension work. The course of study, which leads to the degree of Bachelor of Science, combines training in technical agricultural sciences with courses in business management and economics.

AGRICULTURAL ENGINEERING. Agricultural engineering is concerned with the application of scientific engineering principles to agricultural industries. This professional field includes engineering activities related to the design, development and use of mechanical and electrical equipment; structures; and soil and water control systems for the production, processing and preservation of agricultural products and the improvement of rural living. Agricultural engineers are employed by a variety of agricultural industries and organizations for research, development, teaching, and promotional activities.

Shown above, on left, is Stockbridge Hall, center of activities in College of Agriculture. On right, research in animal physiology. Lower panel pictures some of the major areas in the College: forestry laboratory, landscape architecture laboratory, gas chromatographic analysis of food flavors in Department of Food Science and Technology, extension worker in agronomy, animal science laboratory, and plant study in floriculture.

AGRONOMY. The curricula in this area provide basic education and training in soil science, crop science and agrostology. There is sufficient flexibility within the curricula to allow specialization in crops, soils or fine turf.

The core of each curriculum requires those science courses which are basically educational and qualify the individual for investigational, educational or vocational employment in industrial, government or private organizations.

ANIMAL SCIENCE. The animal science curriculum is designed to provide the student with fundamental training in the nutrition, physiology, breeding, selection and management of farm animals.

DAIRY TECHNOLOGY. Major students in dairy technology receive training in the testing, handling, and processing of milk, ice cream, butter, cheese, and other milk products. Practical application is made of chemistry, bacteriology, economics, and engineering in the many phases of dairy work.

ENTOMOLOGY. Courses in entomology acquaint students with all phases of insects and insect control, as well as beekeeping. Trained entomologists find positions in public service and industry, such as teaching at all levels; research, quarantine and regulatory work in State or Federal Service; various roles in public health and pest control activities; research, sales and public relations work in the agricultural chemicals industry; and commercial beekeeping.

FOOD DISTRIBUTION. This course of study is designed to prepare students for careers in management in the food industry and in government agencies concerned with food production, processing and marketing. The curriculum leads to the degree of Bachelor of Science. Substantial emphasis is given to training in the scientific and technical principles that underlie modern food processing and marketing. In addition, the curriculum includes courses in business management and in economics plus specialized courses in food marketing and merchandising.

FOOD MANAGEMENT. The curriculum in Food Management is offered by the Food Science and Technology Department. The program is designed to give the student a general well-rounded background of arts and sciences, coupled with training in subjects useful to the hotel, restaurant, and other food service industries. The nature of the food service industry requires persons with broad, general backgrounds of business training coupled with a scientific knowledge of foods.

FOOD TECHNOLOGY. The curriculum in Food Technology provides scientific and applied training in the principles concerned with the processing, preservation, and packaging of foods and food products. The student's background in chemistry, physics, and microbiology is applied to food technology problems and food analysis. Major fields open to graduates include: (1) technical and production work in the food industries; (2) quality control and analytical work related to food products; (3) government food inspection and grading; (4) technological work and research in government, industry, and education.

FORESTRY. The technical curriculum in forestry is concentrated in the field of forest production and management, and leads to the degree of Bachelor of Science. It has professional status, being accredited by the Society of American Foresters. Graduates are prepared for employment with Federal and State agencies and in private industry.

HORTICULTURAL SCIENCE. The major in Horticultural Science permits specialization in any one of the following areas: Floriculture, Olericulture, Pomology. Each of these areas provides basic training in the scientific principles and applied practices relative to the production and marketing of their respective crops—flowers, vegetables, and fruits.

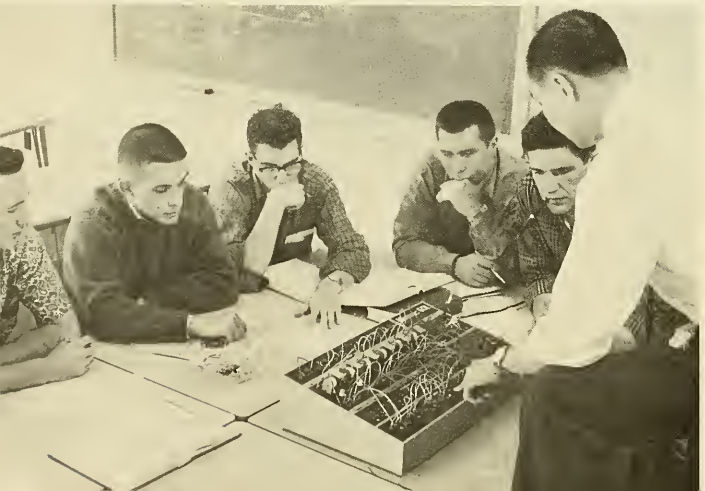
LANDSCAPE ARCHITECTURE. Students following this curriculum, which requires 125 credits for graduation, are prepared through a broad academic approach to take up work in the various phases of landscape architecture. This applied design profession is concerned with the development of land for human use and enjoyment. In addition to the usual areas of interest, such as site planning for private, semi-public and public works of many types, considerable city and regional planning is now available for those interested.

PLANT PATHOLOGY. Plant pathology is concerned with the nature and control of plant diseases caused by fungi, viruses, bacteria, nematodes, certain higher plants and unfavorable environmental conditions. Plant pathologists fill positions in public service and in industry, such as teaching at all levels; research in state, federal, university, and industrial laboratories and experiment stations; and extension service through federal, state, and county organizations.

POULTRY SCIENCE. Two general areas of study are available to the student majoring in this department depending on interests and abilities. (1) Poultry Production and Management—This plan of study will prepare students for farm operations either as owners or managers; as servicemen, specialists and managers in industrial fields; and for federal and state extension work and regulatory programs allied to the poultry industry. (2) Poultry Science—This program is primarily for students interested in and capable of graduate work leading to careers in poultry science teaching and research and as agricultural scientists with breeding organizations, feed manufacturers and pharmaceutical corporations.

WILDLIFE MANAGEMENT. Wildlife management is concerned with the use of land to produce crops of wild game for recreation, control of harvest of game crops and the control of destructive outbreaks of wild species. An understanding of the influence of land use (for farming, forestry, watershed protection and grazing) on the environment and populations of wildlife is necessary. Basic courses are needed in geology, soils, forestry, agriculture, botany, and zoology.

SCHOOL OF BUSINESS ADMINISTRATION



H. B. Kirshen, *Dean*
Draper Hall

The School of Business Administration prepares students to take advantage of important economic opportunities and eventually to assume positions of responsibility in business. The School's educational program is directed toward the broad aspects of business, encouraging high standards of ethical conduct, broad social responsibilities and the development of competence in particular courses of study of the student's own interest, aptitude and choice.

The first two years emphasize general education by providing fundamental courses in the humanities, mathematics, science and social science. In addition, basic courses in accounting and economics prepare the student for further work in the School of Business Administration. The junior and senior years emphasize a greater degree of specialization and provide for this in the programs indicated below. But even in these last two years all students need to view business as a whole in so far as a "core" of courses can do this. This "core" of courses is listed below under the junior-senior curricula and is required of all students. A total of at least 120 credit hours is required for graduation exclusive of credit received in the required military and physical education courses. Each course of study leads to the degree of Bachelor of Business Administration.

Beginning with the class of 1962, the passing of a comprehensive examination is a requirement for a degree for majors in the department of accounting. Comprehensive examinations may also be required by other departments of the School.

Beginning with the class of 1964 all students in the School of Business Administration must attain, as a graduation requirement, a 2.0 average in Accounting 25 and 26, Elementary Economic Statistics 79, and the junior "core" courses: Finance 55, Financial Institutions; Finance 65, Corporation Finance; General Business 71, Business Law I; Management 61, Principles of Management; and Marketing 53, Principles of Marketing. The "core" must be completed by the end of the junior year unless a student, on recommendation of his department chairman, has received permission from the Dean to postpone any such course to the senior year.

Students transferring to the School of Business Administration from any School or College within the University shall receive junior and senior elective credit only for those courses passed with a grade of C or better.

Above is the soon-to-be-completed School of Business Administration building. Below, a class in computer techniques for business analyses.

The School of Business Administration is a member of the American Association of Collegiate Schools of Business.

Major courses of study are available in the School of Business Administration as follows:

ACCOUNTING. The accounting program is designed to prepare students for public accounting and for positions as accountants in business, industry and government.

GENERAL BUSINESS AND FINANCE. The department has three major programs: *Finance, Business Administration and Economics,* and *General Business.* The curriculum in finance is directed towards the fields of banking, investment, brokerage, insurance or governmental agencies concerned with finance. The curriculum in Business Administration and Economics comprehends a wider field to balance a knowledge of both economics and business. The curriculum in General Business was designed for students who do not wish to specialize in any particular field.

MANAGEMENT. Industry and business offer qualified students an opportunity to find careers in General Management, Production Management, and in Personnel Management and Industrial Relations. Course programs are offered in each of these fields and provide the student both a specialized and a comprehensive understanding of the managerial process in industrial enterprises.

MARKETING. Students in marketing prepare for a variety of positions in wholesale and retail enterprises and in the sales activities of manufacturers. The program includes specialized study of basic types of market operations such as advertising, sales management and retailing.

Students in the School learn to use complex office machines.

Periodicals library in the School of Business Administration.

An advanced class in general business and finance.

SCHOOL OF EDUCATION

Albert W. Purvis, *Dean*
School of Education Building

The School of Education through its undergraduate program seeks to utilize the forces of the University to prepare teachers for elementary and secondary schools and through its graduate offering to prepare administrators and specialists in public education. Its program is based upon the assumption that teachers and other school personnel should have a broad liberal education, considerable mastery of at least one field, and professional courses which should lead to a knowledge of the persons to be taught, familiarity with the problems to be met, and practice in the best techniques of teaching and supervision. In all of this the School of Education takes the position that teacher education is a University function and that success will come only if the School is successful in maintaining the closest possible relationships with other schools and departments that contribute to the program.

All students who contemplate teaching as a career should register early, in their freshman year if possible, with the School of Education although their courses in education do not begin until the junior year. In general, students are admitted without question to the various service courses of the junior and senior years, but admission to the teacher-training program of the concentrated semester block is determined by a composite rating based on scholarship as shown by University grades (a three-year average at least as high as the University median is desired), success in the beginning courses in education, recommendations of University teachers in general education fields, and personality ratings by members of the staff.

ELEMENTARY SCHOOL TEACHING. Candidates for this program major in elementary education. In certain cases, with the approval of the Dean of the School of Education, the student may be permitted to major in some department of the College of Arts and Sciences where the general education program is deemed the equivalent of that designed for elementary education majors. This permission should be requested in freshman year. Such students will satisfy the requirements of their major department so far as the first two years are concerned but they should utilize their electives to take such courses as Government 25, Zoology 54, History, 25, 26 and Art or Music which are recommended by the School of Education. They should take Education 9, 39, 59. The core program for elementary education majors including Education 51 and 64, and Psychology 65 or Home Economics 70, and the Elementary Education Block should be token in the junior and senior years.

SECONDARY SCHOOL TEACHING. All candidates for secondary school teaching will major in the subject field to be taught and minor in education. A maximum of eighteen hours should be taken in this minor. Educotion 51 and Psychology 56 are required during junior year and Education 52, 88, 85

Above, the new School of Education building. Below, a laboratory in remediol reading techniques.

(called the secondary block) in one semester of senior year. Since the concentrated semester block in secondary school teacher-training carries only twelve credits students should consult with their major adviser regarding means of making up the extra three credits, and of meeting all their major requirements in the three semester of junior and senior years.

SPECIAL FIELD PROGRAMS FOR PROSPECTIVE TEACHERS. In Vocational Agriculture (R. C. Jones, adviser). This program is based on a cooperative agreement between the University and the Vocational Division of the State Department of Education which provides supervisors and consultants in conducting the program. Students otherwise qualified may prepare to teach vocational agriculture by the satisfactory completion of Education 72, 73, and 75. Education 52 is also recommended. To insure a desirable range of preparation, students who contemplate vocational teaching should consult, early in the freshman year if possible, Professor Jones and Mr. W. H. Annis.[1]

[1]Mr. Annis is State Supervisor for Agricultural Teacher-Training representing the Vocational Division of the State Department of Education in the administration of vocational agricultural acts.

A vocational teacher-training certificate is awarded by the Vocational Division to those who fully qualify.

In Home Economics (Mrs. Marjorie Sullivan, adviser). These students will major in home economics and minor in education. They should elect Education 51, Psychology 56, Home Economics 81 and the concentrated semester block (Education 52, 85).

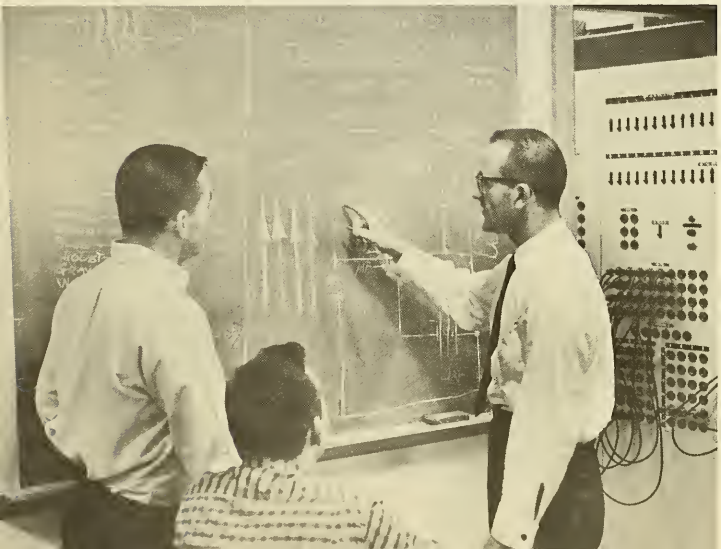
In Teacher Coaching (S. W. Kauffman, adviser). These students will major in physical education and minor in education. They should elect Psychology 56 and the concentrated semester block (Education 52, 88, 85). They should elect a minor teaching field from the College of Arts and Sciences consisting of a minimum of eighteen hours.

In Music (D. Alviani, adviser). These students will major in music and minor in education. They should elect Education 51, Psychology 56, Music 87, and the concentrated semester block (Education 52, 85).

Class in audio-visual methods.

Students observing a classroom in the Mark's Meadow Laboratory School.

SCHOOL OF ENGINEERING



George A. Marston, *Dean*
Main Engineering Building

The departments of Chemical Engineering, Civil Engineering, Mechanical Engineering and Electrical Engineering comprise the School of Engineering. Each department offers a curriculum leading to a Bachelor of Science degree in that particular branch. A curriculum in Industrial Engineering is offered in the Mechanical Engineering department. All curricula are accredited by the Engineers Council for Professional Development.

Engineering can be defined as the combination of science and art by which materials and power are made useful to mankind. An engineer requires intensive technical training but at the same time he should acquire the broad education that distinguishes the professional man from the technician. His education does not end with formal schooling but continues throughout his life as he accumulates experience.

The curricula in engineering have been carefully prepared to offer each student the opportunity to acquire the sound training in mathematics and the basic sciences of chemistry and physics upon which is built the work in the engineering sciences. In the senior year courses are offered which enable the student to use his previous training for engineering analysis, design and engineering systems in his particular field of interest. About twenty per cent of his time is devoted to studies in the social science and humanistic area. Some opportunity is provided to elect courses from both the technical and humanistic-social fields.

The curriculum of the freshman year is the same for all. Specialization to a limited extent begins in the sophomore year.

CHEMICAL ENGINEERING. Chemical Engineering is concerned with the development of manufacturing processes in which chemical or certain physical changes of materials are involved. These are resolved into a coordinated series of unit operations (physical changes) and unit processes (chemical changes). The work of the chemical engineer is primarily concerned with the design, construction, and operation of equipment and plants in which these are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineers are employed not only in industry manufacturing chemicals but in many others, such as petroleum refining, coal processing, refractories and clay products, cement, waste treatment, pulp and paper, rayon and textiles, paint and varnish, natural and synthetic rubber, foods, leather, plastics, soap, penicillin and other antibiotics. Much of the work of the atomic energy program is chemical engineering. The types of work done by chemical engineers include: design, construction, research, development, production, financial and patent appraisal, management, and sales.

Above, the Main Engineering Building. Below, classroom demonstration in electrical engineering.

CIVIL ENGINEERING. Civil engineering is concerned with structures, transportation, movement of fluids, use and storage of water, sanitation, and surveying and mapping. A civil engineer may be engaged in research, in planning and designing, in construction, or in maintenance and operation.

The curriculum gives a thorough training in the fundamental physical sciences and at the same time prepares a student for work in any branch of civil engineering, allowing him to specialize to some extent in whatever branch is most interesting to him—sanitation, mechanics and structures, hydraulics, foundation engineering, highway engineering.

ELECTRICAL ENGINEERING. Electrical engineering deals with the engineering applications of electricity. Because of its unusual amount of diversity, it is usually convenient to separate it into such main divisions as power, communications, electronics and control, and others.

The undergraduate curriculum is designed to prepare the student for work in any of these fields and to serve as a basis for further specialization. Courses in liberal arts and in engineering courses outside of the department give the student an understanding of the broader aspects of engineering and other fields.

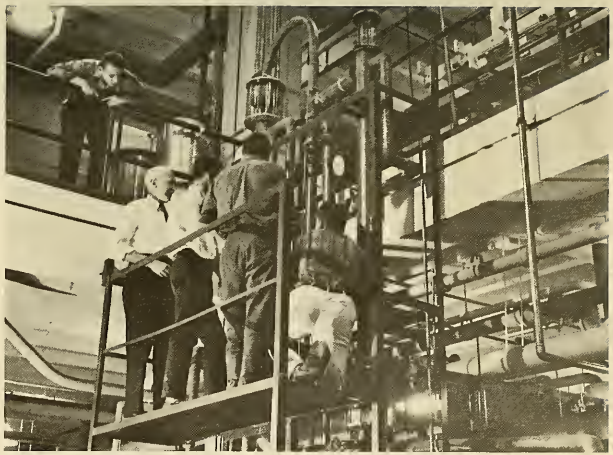
MECHANICAL ENGINEERING. Mechanical engineering is that branch of the profession which, broadly speaking, covers the fields of heat, power, design of machinery, industrial management and manufacturing problems.

Building upon a foundation of mathematics, physics, and chemistry, the department of mechanical engineering undertakes to show the student how fundamental physical laws apply to this field and to give him thorough training in the basic principles so that particular application can be mastered in professional practice. Therefore, no attempt is made to give highly specialized instruction.

INDUSTRIAL ENGINEERING. Industrial engineering is concerned with the engineering aspects of the organization, operation and management of manufacturing plants. Consequently, the industrial engineering curriculum is built on a foundation of mechanical engineering. To the technical knowledge and scientific attitude developed through the study of engineering is added the study of certain courses in the humanities, in economics, and in management.

ENGINEERING SCIENCE OPTION. Engineering science is concerned with the application of the basic sciences to research and development in the engineering field. As such the curriculum contains extensive mathematics, physics, and other courses in the basic sciences designed to develop the student's skill in precise physical reasoning, analysis and synthesis. The student may elect the option from one of the four major departments at the end of his sophomore year provided he has completed his freshman and sophomore years with a quality point average of 2.80 or above or has achieved a cumulative average of 3.20 for the two preceding semesters.

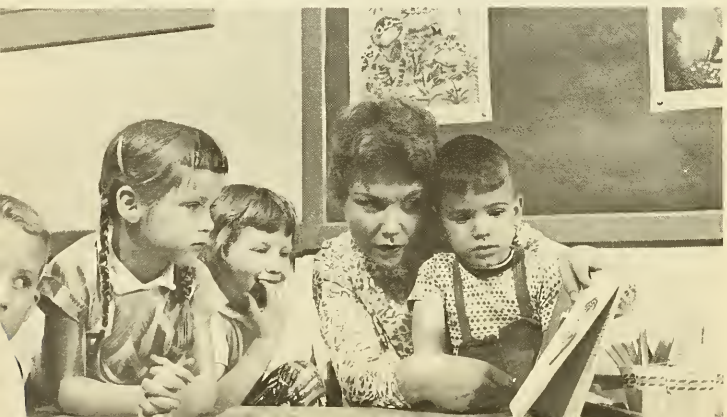
The freshman year is the same for all students and the sophomore year corresponds to that major department in which the student is enrolled.



Studying techniques in chemical engineering.

Class in drafting in the School of Engineering.

SCHOOL OF HOME ECONOMICS



Marion A. Niederpruem, *Dean*
Skinner Hall

The School of Home Economics encompasses an area of study which applies the principles and concepts of the fundamental arts and sciences to the physiological, psychological, social, and economic environmental needs of man.

The curricula of the school have been designed to provide a liberal education with depth in specialized areas of Foods and Nutrition, Textiles-Clothing and Related Arts, and Home Economics Education to insure professional competence. The transitional continuing relationships between liberal and professional education seek to develop in the student a disciplined mind, mental curiosity, and professional aspirations.

Options under these majors lead to challenging and creative positions in industry, government, business, education, and service. Experience and advanced study in areas of specialization are needed to meet the demand for competent Home Economists to assume responsible roles in today's progressive society, and to develop the administrators, executives and research leaders for the future. The candidates for the Bachelor of Science degree in Home Economics will meet the University's general education requirements and core courses in Home Economics as well as specific requirements prescribed in each field of specialization.

The following new curricula will become effective with the class of 1966. For currently enrolled upperclass students a transitional program will be evolved integrating the new courses.

Food and Nutrition

Food and Nutrition offers curricula which provide a strong foundation in the arts and sciences to support basic courses in foods and nutrition under two options: Dietetics and Institutional Administration; and Food and Nutrition in Business.

DIETETIC AND INSTITUTIONAL ADMINISTRATION. This curriculum is planned to meet the basic requirements of the American Dietetic Association for admission to approved dietetic internships or other on-the-job training programs. In addition, the curriculum includes liberal studies to help meet the demands of today's society. The program prepares the graduate for positions as staff and administrative dietitians in various types of food service; nutritionists with schools, public health and social welfare agencies; teaching and research dietitians. The sequence offers opportunities for further work at the graduate level for the student interested in college teaching, positions with extension

Above, Skinner Hall, housing the School of Home Economics. Below, pleasant session for student majoring in nursery school education.

and other government services, research in institutions of higher learning, medical centers and industry.

FOOD AND NUTRITION IN BUSINESS. This curriculum is based on professional training in Food and Nutrition combined with selected courses in the humanities, social sciences and business. The program is designed for the student who is oriented to the business world, and leads directly into product development or consumer services with food and equipment industries. Positions are open in the field of communications for the student who combines her knowledge of Food and Nutrition with Journalism, English and Public Speaking. Graduates with a major in this sequence are also placed in advertising and public relations agencies or with a consulting firm. This curriculum allows students to pursue graduate study.

Textiles, Clothing and Related Arts

FASHION IN RETAILING AND BUSINESS. The retailing and professional opportunities associated with clothing, textiles, home furnishings and related merchandise are limitless. They include positions with manufacturers, producers, retailers, buying organizations, newspapers and magazines, radio and TV, consumer groups as well as educational institutions and social and government agencies. The student who is interested in the business field can get, by specializing in this area, a curriculum with a strong program of liberal arts with emphasis on the social sciences. Courses which build on this base toward professional business competency include fundamentals of clothing, textiles, fashion and related arts as well as courses in business, retailing and related subjects.

Home Economics Education

Home Economics Education offers curricula which provide a broad cultural education and preparation for teaching under two options: Secondary Education and Extension; and Nursery School Education.

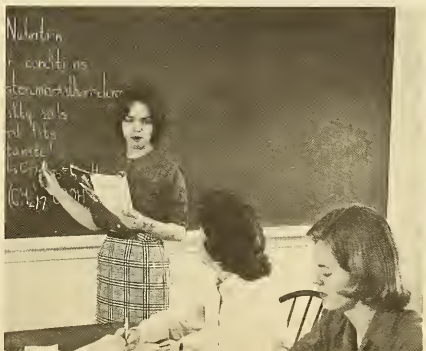
SECONDARY EDUCATION AND EXTENSION. The School of Home Economics, in cooperation with the School of Education, prepares students for teaching Home Economics in junior and senior high schools. Students interested in Home Economics Extension, with the aid of an extension adviser, select courses that prepare them for continuing education positions in extension in both adult and 4-H programs. This curriculum provides basic training for graduate work in the field of home economics teaching and extension.

NURSERY SCHOOL EDUCATION. Students with a special interest in young children may elect this option. All are required to take courses in the College of Arts and Sciences which enrich the basic courses of the Nursery School Education curriculum. Observation and participation in the nursery school activities facilitate the study of the pre-school child. More intensive specialization for qualified students may be obtained through the election of one semester affiliation during the senior year with: (1) Merrill-Palmer School in Detroit, Michigan, which specializes in the study of human development and family life; (2) Eliot-Pearson School in Boston, Massachusetts, which gives professional training for teaching in nursery schools and kindergartens. This option prepares the student to become a nursery school teacher, a teacher of exceptional children — nursery school level, or a teacher in hospital recreation programs. A student graduating with an option in Nursery School Education is well-qualified to pursue graduate work.

A field trip for students in fashion retailing.

Interior decorating— a world of design and color.

Seminar in nutrition for majors in dietetics.



Laboratory in experimental foods.

SCHOOL OF NURSING

Mary A. Maher, *Dean*
School of Nursing
Western Massachusetts
Public Health Center

The basic nursing curriculum is designed as a four-year academic program to prepare the qualified high school graduate for a career in professional nursing, as well as for the responsibilities of family and community life.

The program aims to equip the graduate with those understandings and skills which are needed to function effectively in beginning positions in a variety of nursing situations. These include the ability to provide competent nursing care to patients and families in the hospital, home and community; to participate with allied professional and citizen groups for the improvement of total health services to individuals and communities; to participate in organizing, planning and directing the work of nursing auxiliary workers. A foundation is laid for advanced study, through which the nurse may prepare for positions in teaching, supervision, administration, consultation and research.

During the first two years at the University, the student builds an educational foundation upon which to base the more specialized portion of the program. Courses in the humanities and in the sciences—biological, physical and behavioral—are taken with other students on the campus.

The clinical aspects of the program are developed beginning with the first year. Instruction and correlated clinical practice are given in selected cooperating agencies by the nursing faculty of the University and the allied professional staffs of the cooperating agencies. These agencies include: the Springfield Hospital; the Wesson Maternity Hospital, Springfield; the Visiting Nurse Association of Springfield, the Springfield Health Department; and other community health, educational and welfare resources.

The Bachelor of Science degree, awarded upon successful completion of this program, qualifies the graduate for State Board Examinations in Nursing. If achievement in these examinations is satisfactory, the candidate receives legal status as a registered nurse within the state.

The program is fully accredited by the Accrediting Service of the National League for Nursing.

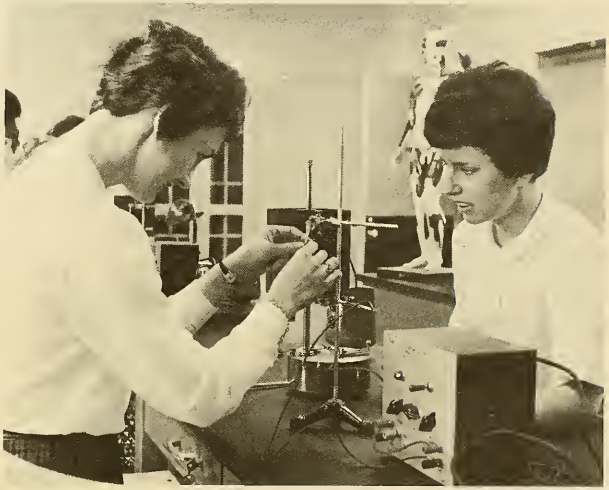
Above, the Western Massachusetts Public Health Center, home of the School of Nursing. Below, Students involved in study session in hospital library. Uniform is one designed especially for University nursing students.

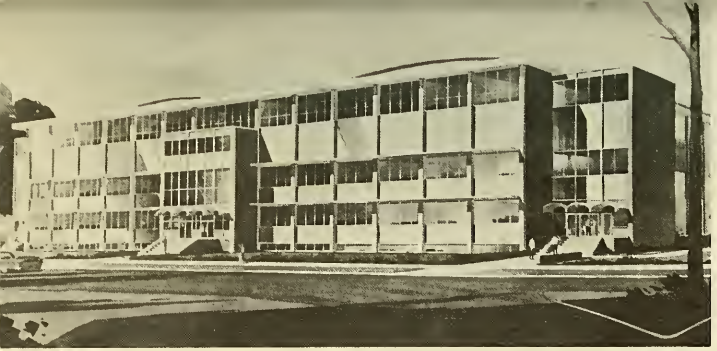
Library in the School of Nursing.

The essential background—knowledge of anatomy and physiology . . .

Training in the children's ward of a hospital.

. . . of laboratory techniques in many areas.





SCHOOL OF PHYSICAL EDUCATION

Warren P. McGuirk, *Dean*
Curry Hicks Physical Education Building

The School of Physical Education includes the Departments of Physical Education for Men, Physical Education for Women, Recreation Leadership, and Athletics. It offers a major in Physical Education and in Recreational Leadership.

Physical Education for Men

GENERAL PROGRAM. Each male freshman and sophomore student, unless exempted under certain conditions, must successfully complete four semesters of physical education and demonstrate his ability to swim as a requirement for his degree. The physical education requirement does not apply to those students excused by the University physician, veterans of military service, and certain transfer students.

Students may receive credit for physical education, during the sport in season, by becoming squad members of any freshman or varsity team. Freshmen who elect an athletic team sport for physical education credit must rejoin their class sections at the termination of the seasonal sport. Students may not participate in a given sport for credit for more than two semesters.

To fulfill requirements, all students must participate in three team sports, four individual activities and acquatics.

MAJOR PROGRAM. The major program leading to the degree of Bachelor of Science in physical education is designed to train the student for a career as a teacher of physical education. The curriculum combines both general and professional education and provides for full teacher certification for the student who has met the prescribed requirements of preparation. The program also provides for adequate training in a minor area of teaching, elected by the student, including the coaching of inter-school athletics.

Physical Education for Women

GENERAL PROGRAM. Physical Education is required of all women students during their freshman and sophomore years. The courses are planned to provide recreative activity, to improve individual skills, to develop body grace and efficiency and to increase health and vigor.

The first and second year women students are required to take three class hours a week for a total of eight credits, one for each quarter of satisfactory work.

Above, the soon-to-be completed Frank L. Boyden Physical Education Building.
Below, the Women's Physical Education Building.

MAJOR PROGRAM. The major course in physical education is planned to prepare women students for professional careers. Especial attention is given to preparing teachers for elementary and secondary schools in both physical and health education. Other areas for which the graduate will qualify are teaching sports and dance in social agencies, industrial plants, civic centers and camps. A foundation will be laid for specialization in graduate study.

The curriculum gives a broad general background as well as the professional preparation. There is opportunity for individual selection in order to provide a minor.

Recreation Leadership

MAJOR PROGRAM. The department seeks to prepare men and women for positions involving administrative, supervisory and program leadership responsibilities in municipal recreation agencies, voluntary and youth-serving agencies, hospitals, and industrial and institutional organizations.

The program is designed to provide opportunities for a general education, a knowledge and understanding of people and society, activity skills and resource knowledge, professional competency, and practical experience in various leadership situations.

In addition to completing the curriculum as described below, the student is required to:

(1) attend a professional conference approved by the department;

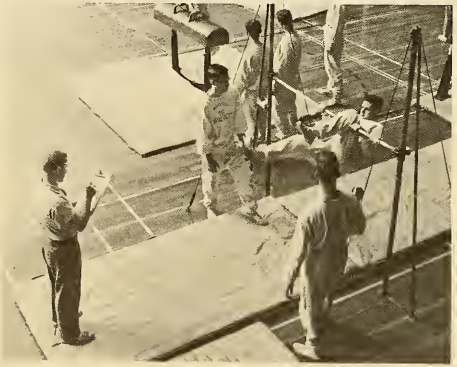
(2) participate in programming activities at the Student Union, with a scout troop, or in a similar setting approved by the department;

(3) devote one summer (minimum of six weeks) to a recreation position, preferably with pay, in a camp, playground, or similar setting approved by the department.

Department of Athletics

(W. P. McGuirk, *Director*; E. E. Lorden, *Assistant Director.*) The following men coach intercollegiate athletics and intramurals: R. E. Bergquist, freshman coach of baseball and Stockbridge basketball; L. E. Briggs, coach of varsity soccer; J. L. Cobb, assistant coach of track and director of intramural athletics; J. J. Delaney, assistant coach of football; C. B. Demers, athletic trainer; J. G. Douglas, coach of wrestling; W. Footrick, coach of track and cross country; V. H. Fusia, coach of football; R. F. Garber coach of lacrosse; C. S. Gladchuck, assistant coach of football and coach of golf; F. J. Glatz, assistant coach of football; R. J. James, varsity coach of gymnastics; V. A. Keedy, head athletic trainer; S. R. Kosakowski, director of Stockbridge athletics and coach of hockey and tennis; J. A. Leaman, Jr., freshman coach of basketball and soccer; E. E. Lorden, coach of baseball; R. W. O'Connell, financial manager of athletics; R. H. Page, director of sports information; B. Ricci, coach of freshman lacrosse; H. R. Rogers, Jr. coach of swimming; T. S. Schmitt assistant football coach; M. Zunic, coach of basketball.

TO KEEP AMERICA PHYSICALLY FIT—A few of the activities associated with the major areas in the School of Physical Education.



DEPARTMENT OF PUBLIC HEALTH

Robert W. Gage, Chairman

Students majoring in Public Health may select divisional classification in accordance with their special interests.

The Department of Public Health offers programs leading to the Bachelor of Science degree in Environmental Health and the Bachelor of Science degree in Medical Technology. The Master of Science degree in Environmental Health is also offered.

PUBLIC HEALTH. The curriculum in public health is designed to prepare a student for a health career. Career opportunities are open in: (1) administration of health services; (2) in basic sciences related to health; (3) in environmental health services; (4) in food and drug protective services; (5) in health education; and (6) in health information and communications.

MEDICAL TECHNOLOGY. The curriculum in medical technology is recommended for young men and women as a profession offering a wide opportunity of occupational outlets. Medical technology graduates may be prepared for positions in medical laboratories, in federal, state and local health departments, and in commercial and research laboratories.

Following graduation the student will be assisted in arranging for a 12-month internship in an approved hospital laboratory. The student must complete all of the requirements established by the American Society of Clinical Pathologists to qualify for the Registry of Medical Technology.

OPTIONAL PROGRAM IN MEDICAL TECHNOLOGY. Students may elect an optional program some time during their freshman year which will permit completion of both the requirements for the Bachelor of Science degree and one year of hospital internship required by the Registry of Medical Technology in a total of four years. This can be accomplished by scheduling the required courses listed in the four-year academic program in three academic years plus summer school sessions. After successful completion of at least 120 credits and satisfying the requirements of the Department of Public Health a student will receive a Bachelor of Science degree.

DIVISION OF MILITARY AND AIR SCIENCE

The Division of Military and Air Science includes the Department of Military Science and the Department of Air Science. No major is offered in either department. All physically qualified male students (except veterans with over six months' active service and students transferring to the University of Massachusetts as full-time bona fide sophomores, juniors or seniors from any other institution which does not require ROTC training) who enroll in a school or college leading to an undergraduate degree at the University are required to complete the two-year basic ROTC course (Army or Air Force). Male students who are certified by the Director of the University Health Service as being not physically qualified are excused from attendance at military drill, but are not excused from attendance at Military or Air Science classes. In making application for admission to the University conscientious objectors may apply to the President of the University for authorization to be excused from this requirement.

DEPARTMENT OF MILITARY SCIENCE (Armor)

Albert W. Aykroyd, Colonel, Armor, Head

The Army Reserve Officers Training Corps is the means by which young men who have taken the leadership step of coming to the state university may assure themselves that their military service is performed in commissioned status. The first two years are basic training in leadership and citizenship. The student is informed on the position of the military in the current scene and as it relates to his future. The second two years of ROTC are not only elective, but selective. The best qualified students are selected and are permitted to contract to continue on to a reserve commission. The Army provides these men a subsistence allowance and additional emoluments. There is a six-week summer camp training period between the junior and senior year. Participation in ROTC has notable effect in character development. It also discloses to the army existing officer material and its potential leaders. Successful completion of this program leads to a commission as a Second Lieutenant, U. S. Army Reserve. Active duty requirements are, at the present time, two years service with an active Army unit.

DEPARTMENT OF AIR SCIENCE

Thomas Carhart, Colonel, U. S. A. F., Head

The mission of the department program is to develop in selected college students, through a permanent program of instruction, those qualities of leadership and other attributes essential to their progressive advancement to positions of increasing responsibility as commissioned officers in the United States Air Force. It is not expected that all so commissioned will select the U. S. A. F. as a career; nevertheless, the program does offer an excellent means to prepare for such a career. The first two years of instruction, the basic course, give a foundation for leadership and air and space age citizenship. The program of the last two years, advanced Air Force ROTC and four weeks of summer training at the end of the junior year, is designed primarily to enhance the professional knowledge and leadership capabilities of those qualified and selected for officer training.

COURSE REQUIREMENTS IN THE FRESHMAN YEAR

The following listings are designed to give prospective students a complete schedule of the courses required in the freshman year in all colleges and schools of the University.

COLLEGE OF ARTS AND SCIENCES

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics or Natural Science[1]	3	Mathematics or Natural Science[1]	3
Natural Science or History 5[2]	3	Natural Science or History 6[2]	3
Foreign Language[3]	3	Foreign Language[3]	3
Elective[4]	3	Elective[4]	3
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1
Physical Education 1, 2 (men)**	2	Physical Education 3, 4 (men)**	2
Physical Education 5, 7 (women)**	2	Physical Education 6, 8 (women)**	2

[1]Candidates for the B.S. degree take Mathematics. Those planning to major in chemistry or physics should, if passible, elect Mathematics 5 and 6.

[2]Candidates for the B.S. degree take natural science; candidates for the B.A. degree take History 5 and 6.

[3]Subject to exemption on basis of proficiency examination.

[4]Candidates for the B.S. degree take science.

*May be taken either semester.

**Not quality point credit.

COLLEGE OF AGRICULTURE

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Compasitian	2	English 2, Compasition	2
Speech 3*	2	Speech 3*	2
Mathematics 1, Intraductory[1]	3	Mathematics 2 or 4[1]	3
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1, General	3	Zoology 1, General	3
Military or Air Science 1 (men)	1	Elective[2]	3
Food Economics 1	2	Military or Air Science 2 (men)	1
Physical Education 1, 2 (men)**	2	Physical Education 3, 4 (men)**	2
Physical Education 5, 7 (wamen)**	2	Physical Education 6, 8 (women)**	2

[1]Candidates for the Bachelor of Vacational Agriculture degree must take Mathematics 01 (in place af Mathematics 1) and either Mathematics 12 or 1 (in place of Mathematics 2).

[2]Elective may be any freshman or sophamore course—most will elect Animal Husbandry 2, Horticulture 2, Entomology 26 or Farestry 26. Some majors in Wildlife Management, Food Management, or Food Technalogy may prefer a year of fareign language to the Food Economics 1-elective sequence. Food Distributian majors will take Micrabiology 31.

*May be taken either semester or during a later year.

**Not quality point credit.

All freshman agriculture majors take this program except those majoring in Agricultural Engineering. The latter take the following curriculum:

COLLEGE OF AGRICULTURE (Continued)

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Diff. Calculus	4
Math. 5, Analy. Geom.	4	Chem. 2 or 4, General	3
Chem. 1, General	3	Mech. Engin. 2, Drawing	3
Mech. Engin. 1, Drawing	2	Physics 6, General	3
Physics 5, General	3	Military or Air Science 2	1
Military or Air Science 1	1	Physical Ed. 3, 4*	2
Physical Ed. 1, 2*	2		

*Not quality point credit.

SCHOOL OF BUSINESS ADMINISTRATION

In each subject a one year sequence is required.

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Mathematics	3-4	Mathematics	3-4
Hist. 5, 25, or Govt. 25	3	Hist. 6, 26, or Govt. 26	3
Science: elect one	3	Science: continue 1st sem. sci.	3
Chemistry 1		Chemistry 2	
Physics 3		Physics 4	
Botany 1		Botany 25	
Geology 1		Geology 2	
Zaology 1		Zoology 25 or 35	
Elective†	3	Elective†	3
Military or Air Science 1	1	Military or Air Science 2	1
Physical Ed. 1, 2 (men)**	2	Physical Ed. 3, 4 (men)**	2
Physical Ed. 5, 7 (wamen)**	2	Physical Ed. 6, 8 (women)**	2

*May be taken either semester.

**Not quality point credit.

†If a language is elected the student must complete the intermediate year ta meet the basic School requirement.

If a language is not elected:

Where Government has been elected the student shall elect one af the following: History 5, 6, 25, 26, Economics 12.

Where History has been elected the student shall elect Government 25.

The student shall select, with the help af an adviser, a ane-semester elective.

SCHOOL OF EDUCATION

1st Semester	Credits	2nd Semester	Credits
English 1	2	English 2	2
Speech 3*	2	Speech 3*	2
Moth. 1 or Chem. 1	3	Math. 2 or 4 or Chem. 2	3
Zool. 1 or Bot. 1	3	Bot. 1 or Zool. 1	3
Foreign Lang.**	3	Foreign Lang.**	3
History 5	3	History 6	3
Education 9†		Education 9†	
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1
Physical Ed. 1, 2 (men)‡	2	Physical Ed. 3, 4 (men)‡	2
Physical Ed. 5, 7 (women)‡	2	Physical Ed. 6, 8 (women)‡	2

*May be taken either semester.
**Intermediate Proficiency Required.
†To be completed in a school year.
‡Not quality point credit.

SCHOOL OF ENGINEERING

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Calculus	4
Math. 5, Analy. Geom. and Calc.	4	Chem. 2 or 4, General*	3 or 4
Chem. 1 or 3, General*	3	M. E. 2, Desc. Geom.	3
M. E. 1, Graphics	2	Physics 6, General	3
Physics 5, General	3	Military or Air Science 2	1
Military or Air Science 1	1	Physical Ed. 3, 4†	2
Physical Ed. 1, 2†	2		

*It is recommended that Chemical Engineering majors take Chemistry 3 and 4 in place of Chemistry 1 and 2.
†Not quality point credit.

SCHOOL OF HOME ECONOMICS

Key: FN—Food and Nutrition
TCRA—Textiles, Clothing and Related Arts

MAJOR IN DIETETIC AND INSTITUTIONAL ADMINISTRATION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3*	2	Chemistry 2, General	3
Chemistry 1, General	3	Psychology 1, General	3
FN 27, Man and Nutrition	3	Mathematics 1, Introduction	3
Foreign Language or Humanities Elective	3	Zoology 1, Introduction	3
Sociology 25, Introductory	3	Physical Education 6, 8†	2
Physical Education 5, 7†	2		

*May be taken either semester.
If a foreign language is elected, student must complete the intermediate year.
†Not quality point credit.

SCHOOL OF HOME ECONOMICS (Continued)

MAJOR IN FOOD AND NUTRITION IN BUSINESS

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3, Communications	2	Psychology 1, General	3
Chemistry 1, General	3	Chemistry 2, General	3
FN 27, Man and Nutrition	3	Zoology 1, Introductory	3
Sociology 25, Introductory	3	TCRA 23, Art for Living	3
Elective	3	Elective	3
Physical Education 5, 7†	2	Physical Education 6, 8†	2

†Not quality point credit.

MAJOR IN FASHION IN RETAILING AND BUSINESS

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Speech 3, Communication	2	Science, Physical or Biological	3
Science, Physical or Biological	3	Psychology, 1	3
Sociology 25	3	Language	3
Language	3	TCRA 24, Textiles I	3
TCRA 23, Art for Living	3	Physical Education 6, 8†	2
Physical Education 5, 7†	2		

†Not quality point credit.

MAJOR IN SECONDARY EDUCATION AND EXTENSION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 1, Composition	2
Speech 3, Oral Communication	2	Psychology 1, General	3
Chemistry 1, General	3	Chemistry 2, General	3
FN 27, Man and Nutrition	3	Mathematics 1, Introductory	3
Sociology 25, Introductory	3	TCRA 24, Textiles I	3
Government 25	3	Physical Education 6, 8†	2
Physical Education 5, 7†	2		

†Not quality point credit.

MAJOR IN NURSERY SCHOOL EDUCATION

1st Semester	Credits	2nd Semester	Credits
English 1, Composition	2	English 2, Composition	2
Zoology 1, Introductory	3	Economics 25, Elements of	3
Foreign Language	3	Foreign Language	3
FN 27, Man and Nutrition	3	Sociology 25, Introductory	3
Psychology 1 or 5, General	3	Elective	3
Speech 3, Oral Communication	2	Physical Education 6 and 8†	2
Physical Education 5 and 7†	2		

†Not quality point credit.

SCHOOL OF NURSING

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Chemistry 1	3	Chemistry 2	3
Soc. 25 or Psych. 1	3	Soc. 25 or Psych. 1	3
Zoology 1	3	Nursing 1	3
Social Science Elective	3	Social Science Elective	3
Speech 3**	2	Speech 3**	2
Physical Ed. 1a, b	2	Physical Ed. 6 and 8	2

**May be taken either semester.

SCHOOL OF PHYSICAL EDUCATION

PHYSICAL EDUCATION FOR MEN

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
P. E. 23, Principles of Health Ed.	3	Speech 3	2
Mathematics 12 or 1	3	Social Science Elective	3
P. E. 21, Intro. to Phys. Ed.	3	P. E. 22, First Aid and Safety	3
Military or Air Science 1	1	Military or Air Science 2	1
P. E. 5, Skills and Techniques (Lacrosse—Gymnastics)	1	P. E. 6, Skills and Techniques (Gymnastics—Badminton)	1
Elect One		*Elect One*	
Chemistry 1	3	Chemistry 2	3
Botany 1	3	Botany 1	3
Zoology	3	Zoology 1	3

PHYSICAL EDUCATION FOR WOMEN

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Zoology 1, Introductory	3
Hist. 5, Mod. Europ. Civ.	3	Hist. 6, Mod. Europ. Civ.	3
W. P. E. 1, Intro. to P. E.	2	W. P. E. 2, Intro. to Chld. thru P. E.	2
Math. 12 or 1	3	W. P. E. 10, Health for Adults	2
W. P. E. 11, Skills	1	W. P. E. 12, Skills	1
Elective*	3	Elective*	3

*Chemistry 1 and 2 are required if students have not had chemistry in high school. Others may select from Chemistry, Physics, Microbiology, or foreign language.

RECREATION LEADERSHIP

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 12, Functional Math.	3
Bot. 1, Intro. Bot.	3	Zool. 1, Intro. Zool.	3
Govt. 25, American Govt.	3	Soc. 25, Intro. to Soc.	3
Hist. 5, Mod. Europ. Civ.	3	M. P. E. 22, First Aid & Safety	3
Rec. Lead. 1, Intro. to Rec. L.	3	Rec. Lead. 2, Social Rec.	2
P. Rec. 13, Skills & Tech.	1	P. Rec. 14, Skills & Tech.	1
Military or Air Science 1 (men)	1	Military or Air Science 2 (men)	1

DEPARTMENT OF PUBLIC HEALTH

PUBLIC HEALTH

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
Speech 3	2	Speech 3	2
Mathematics 1 or 2	3	Mathematics 4	3
Chemistry 1	3	Chemistry 2	3
Foreign Language	3	Foreign Language	3
Botany 1	3	Zoology 1	3
Military or Air. Sci. 1 (men)	1	Military or Air Sci. 2 (men)	1
Phys. Ed. 1, 2 (men)†	2	Phys. Ed. 3, 4 (men)†	2
Phys. Ed. 5, 7 (women)†	2	Phys. Ed. 6, 8 (women)†	2

†Not quality point credit.

MEDICAL TECHNOLOGY

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3, I or II	2	Speech 3, I or II	2
Chemistry 1, General	3	Chemistry 2, General	3
Botany 1 or Zoology 1	3	Botany 1 or Zoology 1	3
Foreign Language	3	Foreign Language	3
Mathematics 1, Intro.	3	Mathematics 4, Intro.	3
Military (men)	1	Military (men)	1
Phys. Ed., 1, 2 (men)†	2	Phys. Ed., 3, 4 (men)†	2
Phys. Ed. 5, 7 (women)†	2	Phys. Ed., 6, 8 (women)†	2

†Not quality point credit.

DEPARTMENT OF MILITARY SCIENCE (ARMOR)

1st Semester	*Credit*	*2nd Semester*	*Credit*
M. S. 11 or 12	1	M. S. 11 or 12	1

DEPARTMENT OF AIR SCIENCE

1st Semester	*Credits*	*2nd Semester*	*Credit*
One of the following:		Air Science 12, Foundations of	
English 1 or 2	2	Air Power I	1
Mathematics 1, 2, 4, 5 or 6	3		
Speech 3	2		
Chemistry 1, 2, 3, or 4	3-4		
Air Science 11, Leadership Laboratory	1		

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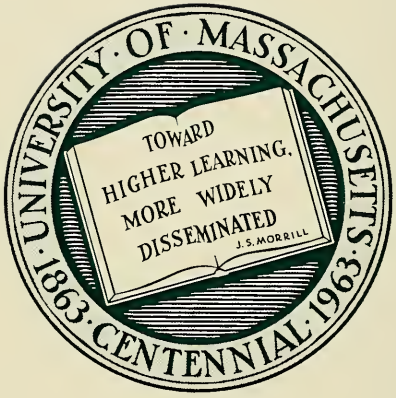
UNIVERSITY of MASSACHUSETTS

BULLETIN

1963-4



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Graduate School

UNIVERSITY OF MASSACHUSETTS

Catalog for 1963-4

UNIVERSITY OF MASSACHUSETTS

Amherst, Massachusetts

Academic Calendar

1963

January 3, Thursday	Last day on which thesis outlines may be handed in by Master's degree candidates who plan to finish their work by the 1963 Commencement.
January 11, Friday	Last day of classes.
January 14, Monday, through January 22, Tuesday	Final examinations.
January 31, Thursday	Registration of graduate students.
February 1, Friday, 8 A.M.	Classes begin.
February 22, Friday	Washington's Birthday; a holiday.
March 20, Wednesday	Last day on which graduate students may drop courses without failure.
March 23, Saturday, after last class to April 1, Monday, 8:00 A.M.	Spring recess.
April 19, Friday	Patriot's Day; a holiday.
April 26 or 27, Friday, Saturday	Ph.D. language examinations.
May 7, Tuesday	Counseling Day.
May 22, Wednesday	Last day of classes.
May 24, Monday, through June 3, Monday	Final examinations.
May 30, Thursday	Memorial Day; a holiday.
May 31, Friday	Last day for bound theses to be handed in.
June 7, Friday, through June 9, Sunday	Commencement.

Academic Calendar

1963-1964

September 12, Thursday	Registration of graduate students.
September 13, Friday	Classes begin.
October 3, Thursday	Last day on which Ph.D. candidates who plan to complete their work by the June 1964 Commencement may take the preliminary comprehensive examination.
October 12, Monday	Columbus Day; a holiday.
November 2, Monday	Last day on which graduate students may drop courses without failure.
November 11, Monday	Veterans' Day; a holiday.
November 26, Tuesday, after last class to December 2, Monday, 8:00 A.M.	Thanksgiving recess.
November 29 or 30	Ph.D. language examinations.
December 3, Tuesday	Counseling Day.
December 18, Wednesday, after last class to January 2, Thursday, 8:00 A.M.	Christmas recess.
January 2, Thursday	Last day on which thesis outlines may be handed in by Master's degree candidates who plan to finish their work by the 1964 Commencement.
January 11, Thursday	Last day of classes.
January 13, Monday, through January 21, Tuesday	Final examinations.
January 30, Thursday	Registration of graduate students.
January 31, Friday, 8:00 A.M.	Classes begin.
March 20, Friday	Last day on which graduate students may drop courses without failure.
March 26, Thursday, after last class to April 6, Monday, 8:00 A.M.	Spring recess.
April 20, Monday	Patriot's Day, a holiday.
April 24 or 25, Friday, Saturday	Ph.D. language examinations.
May 6, Wednesday	Counseling Day.
May 21, Thursday	Last day of classes.
May 22, Friday, through June 1, Monday	Final examinations.
May 28, Thursday	Last day for bound theses to be handed in.
May 30, Saturday	Memorial Day; a holiday.
June 5, Friday, through June 7, Sunday	Commencement.

Academic Calendar

1964-1965

September 14, Monday	Registration of graduate students.
September 15, Tuesday	Classes begin.
October 1, Thursday	Last day on which Ph.D. candidates who plan to complete their work by the June 1965 Commencement may take the preliminary comprehensive examination.
October 12, Monday	Columbus Day; a holiday.
November 2, Monday	Last day on which graduate students may drop courses without failure.
November 11, Wednesday	Veterans' Day; a holiday.
November 25, Wednesday, after last class to November 30, Monday, 8:00 A.M. .	Thanksgiving recess.
November 27 or 28	Ph.D. language examinations.
December 8, Tuesday	Counseling Day.
December 19, Saturday, after last class to January 4, Monday, 8:00 A.M. . .	Christmas recess.

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Robert B. Whitney, *Department of Chemistry, Amherst College*
Robert T. Wilce, *Department of Botany*
Thomas O. Wilkinson, *Department of Sociology and Anthropology*
Robert M. Williams, *Department of Chemistry*
Schafer Williams, *Department of History*
Albert E. Wood, *Department of Biology, Amherst College*

Kenneth E. Wright, *Department of Botany, Smith College*
Raymond Wyman, *School of Education*
Henry T. Yost, Jr., *Department of Biology, Amherst College*
John W. Zahradnik, *Department of Agricultural Engineering*
Oliver T. Zajicek, *Department of Chemistry*
Bert M. Zuckerman, *Department of Entomology and Plant Pathology*

The Graduate Council

Edward C. Moore, *Dean of the Graduate School, Chairman*

*Loren P. Beth, *Professor of Government*

*George W. Cannon, *Professor of Chemistry*

*Edwin D. Driver, *Associate Professor of Sociology*

*Irving S. Fagerson, *Professor of Food Technology*

*Peter Heller, *Commonwealth Professor of German*

I. Moyer Hunsberger, *Dean of the College of Arts and Sciences*

*Vincent Ilardi, *Associate Professor of History*

Fred P. Jeffrey, *Associate Dean of the College of Agriculture and Director of the Stockbridge School*

*Phillips R. Jones, *Assistant Professor of Physics*

George W. Kidder, Jr., *Stone Professor of Biology, Amherst College*

H. B. Kirshen, *Dean of the School of Business Administration*

*John H. Lilly, *Head of Department of Entomology and Plant Pathology*

*E. Ernest Lindsey, *Associate Dean of the School of Engineering*

George A. Marston, *Dean of the School of Engineering*

Jytte M. Muus, *Professor of Biochemistry, Mount Holyoke College*

Marian A. Niederpruem, *Dean of the School of Home Economics*

*Charles F. Oliver, *Professor of Education*

Albert W. Purvis, *Dean of the School of Education*

*H. Duncan Rollason, *Associate Professor of Zoology*

*G. Dale Sheckels, *Head of Department of Electrical Engineering*

Kenneth Sherk, *Director of Graduate Study, Smith College*

*Frank A. Singer, *Associate Professor of Accounting*

Arless A. Spielman, *Dean of the College of Agriculture and Director of the Experiment Station and Director of the Extension Service*

*Warren H. Teichner, *Professor of Psychology*

*Robert W. Wagner, *Associate Dean of the College of Arts and Sciences and Professor of Mathematics*

*Anne W. Wertz, *Commonwealth Research Professor, Home Economics*

Gilbert L. Woodside, *Provost*

*—Elected by the Graduate Faculty

General Information

The Graduate School has offered instruction since 1876 and was formally organized as a separate unit in the University in 1908. Its objective is to provide qualified students with proper guidance in the methods of advanced study and research. It is dedicated to the ideal of the advancement of knowledge, and seeks to impart to each student respect for true scholarship.

Courses are available leading to the degree of Doctor of Philosophy, Master of Arts, Master of Arts in Teaching, Master of Education, Master of Business Administration, Master of Landscape Architecture, Master of Science, Master of Science in Accounting, Master of Science in Finance, Master of Science in Agricultural Engineering, Master of Science in Chemical Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, Master of Science in Industrial Engineering, and Master of Science in Mechanical Engineering.

ADMISSION

Requirements for admission:

1. A Bachelor's degree or the equivalent from any college or university of recognized standing. Applications for admission from all graduates of non-accredited schools in the United States must be supported by the result of an objective test such as the Graduate Record Examination or the Miller Analogies Test.

2. Two official transcripts of all previous college work.

3. Two letters of recommendation. It is urged that wherever practicable both letters come from persons in the field of the applicant's academic major at the institution most recently attended. Applicants whose academic references would go back more than five years may substitute other references if desired.

4. The applicant must have been in the upper half of his graduating class. If the transcript does not indicate the rank of the applicant, it is the duty of the Committee on Admissions to evaluate the transcript.

5. Acceptance by the department and by the Admissions Committee of the Graduate Council.

Admission to the Graduate School does not imply admission to candidacy for an advanced degree. Such candidacy is subject to specific requirements as laid down by the several departments, and the student must secure the approval of the Head of the Department in which he desires to major before he can become a candidate for a degree in that subject.

Graduates of Normal Schools are permitted to take courses in the 200 series in the School of Education, but not as candidates for a University of Massachusetts degree.

With the approval of the Head of the Department concerned and the Dean of the Graduate School, special students are permitted to take graduate courses. Special students may not register for thesis credits. If special students do graduate work of high quality they may apply for admission to regular standing in the Graduate School.

ESTIMATE OF EXPENSES

Fees are determined by the number of courses and corresponding credits taken per semester.

TUITION

Tuition for residents of Massachusetts is charged at the rate of $10 per credit up to a maximum $100. Non-residents are charged $15 per credit up to a maximum of $150. In order to take advantage of the lower tuition rate, a student must have on file a Certificate of Residence properly authenticated by his Town or City Clerk.

BOARD

Students may elect to use the facilities of the University Dining Commons at an approximate cost of $166 per semester.

OTHER FEES

1. Any student taking more than two courses shall be required to pay all the following fees:

Student Union	$10 per semester
Health Fee	$15 per semester
Identification Card	$ 1 per year
Blue Cross/Blue Shield	$16 per year (optional)

2. Any student enrolled for less than three courses (living in University housing) shall pay Identification Card and Health Fee.

3. Any student enrolled for less than three courses (*not* living in University housing) shall pay Identification Card fee only.

WAIVER OF TUITION AND FEES

Holders of certain titles are exempt from tuition and certain fees. Waiver forms are available in the Graduate Office. These forms must be processed before registration in order to take advantage of waivers.

Candidates for a Master's degree who have paid a full year's tuition in the Graduate School are not required to pay tuition if they later register only for a Master's thesis.

Candidates for the Doctor of Philosophy degree who have paid two full years' tuition in the Graduate School are not required to pay tuition if they later register only for the Doctor's thesis.

Information about housing may be obtained by writing to the Director of Housing, Draper Hall. A certain number of University apartments are available to graduate students. The Housing Director has a list of rooms that can be rented in private homes at from $30 to $40 per month. The cost of books and incidentals should not exceed $150 per year.

GRADUATE ASSISTANTS

The University offers a number of graduate assistantships for the purpose of assisting with the instructional program of various departments. The stipend varies, up to a maximum of $2535 for the academic year, depending upon the qualifications of the applicant. Graduate Assistants are not required to pay tuition if their stipend is $1267.50 or higher. They may carry up to thirteen credits per semester, but the total for both semesters of any one academic year may not exceed twenty-four credits. Application should be made to the Dean of the Graduate School.

DEPARTMENTAL FELLOWSHIPS

These fellowships are awarded on a competitive basis to graduate students who are doing their major work in any department in the Graduate School. This stipend varies, up to a maximum of $2400 for the academic year, depending upon the qualifications of the applicant. Fellows are not required to pay tuition. At the discretion of the department, they may be assigned to either teaching or research duties, or they may do part-time teaching and part-time research. With the approval of the Department, the research may be that which is required for an advanced degree or it may be part of a departmental research program. Departmental fellows may carry up to thirteen credits per semester, but the total for both semesters of any one academic year may not exceed twenty-four credits. Application for appointment to one of these fellowships should be made to the Dean of the Graduate School.

RESEARCH FELLOWSHIPS

A number of research fellowships are available to qualified graduate students. These are made possible because funds are provided by (a) various industries, (b) the Experiment Station, or (c) research grants awarded to members of the Graduate Faculty either from sources outside the University or from a fund provided by the University and administered by the Research Council. Stipends vary with the type of work and the amount of time involved. Interested students should make application to the Head of the Department in which they plan to work.

LOTTA CRABTREE FELLOWSHIPS

A limited number of fellowships paying $2000 each are available to students in the broad field of agriculture. Students applying for these fellowships must be interested in earning the Doctor of Philosophy degree for the purpose of serving agricultural pursuits. Application should be made to the Dean of the Graduate School.

THE CRAMPTON RESEARCH FUND

Interest from the Guy Chester Crampton Research Fund is used to help defray the costs of publication of worthy research papers completed by students or occasionally by staff members. Information concerning the fields of work for which grants may be made, and instructions for application, may be obtained from Department Heads, the chairman of the Crampton Fund Committee or the Graduate School office.

REQUIREMENTS FOR DEGREES

All of the requirements for the several advanced degrees listed below (Ph.D. and all Master's degrees) must be completed by the applicable date

May 28
September 1
February 1

if the degree is to be received at the Commencement following the particular date.

Doctor of Philosophy

In order to provide proper direction for the Ph.D. candidate, a Guidance Committee of three will be appointed, or if necessary reappointed, for each student as soon as possible after his first registration as a candidate for the doctorate, and not later than two months after his first registration. This Committee will be appointed by the Scholarship Committee of the Graduate Council from members of the Graduate Faculty, recommended by the Department Head of the student's major department, and will consist of two members of the major department and one other person.

This Guidance Committee shall meet with the candidate as soon as possible after the appointment has been made. At least three weeks prior to the candidate's second registration the Committee shall file in the Graduate Office a summary of the proposed major and minor program of the student, including specific courses recommended by the Committee. In addition to this original meeting with the student, the Guidance Committee's responsibilities shall be to:

a. Plan the entire Graduate School program of the student.
b. Arrange for the preliminary written comprehensive examination of the student.
c. Plan for the satisfying of the language requirement by the student.
d. Supervise the thesis project and arrange for the final examination. The Guidance Committee will serve as the Thesis Committee for the Ph.D. candidate.
e. Report the fulfillment of all requirements to the head of the major department, the vote of the Committee to be unanimous on this.

The degree is conferred upon graduate students who have met the following requirements:

1. The preparation of a dissertation satisfactory to the Guidance Committee and the major department.

2. The successful completion of graduate courses in the major field and in a minor field or fields related to, but not part of the major field. The Guidance Committee will determine the number of graduate credits which the student must earn in the major and minor fields.

3. The passing of a preliminary written comprehensive examination in the major and minor fields, supplemented by an oral examination at the option of the major department, both examinations to be conducted by the major department, to be passed not later than eight months before the completion of the candidate's work. This examination may not be taken until after the language requirements have been met (see number 4 below).

The department in which the student has enrolled for courses in the minor field has a choice of submitting questions for the comprehensive examination or the certifying of the student as having satisfied all the requirements of each course, except that the examination is required for all courses where the grade in the course was C.

If the student fails the comprehensive examination he may, at the discretion of the Guidance Committee, be permitted a second and final opportunity.

4. The satisfactory completion of the following language requirements: two languages foreign to the candidate and not in the same linguistic

group, as recommended by the major department. Proficiency tests should be passed as early as possible and must be passed *prior to the preliminary examination.* In lieu of *one* of the above foreign languages, graduate students may, upon the recommendation of their Guidance Committee, present themselves for a Tool of Research examination. If the student passes this examination, he will be required to pass only one foreign language examination.

5. The passing of a final examination, at least partly oral, conducted by the Guidance Committee primarily upon, but not limited to, the contents of the candidate's dissertation. The examination cannot be scheduled until all members of the Thesis Committee have approved the thesis. The oral examination is to be conducted by the Thesis Committee. The Examining Committee is to consist of the Thesis Committee, the Dean of the Graduate School, the Dean of the School or College in which the department is located, and such members of the major department as the head shall appoint. In order to pass, the candidate must receive the unanimous vote of the Thesis Committee. *Not more than one dissenting vote* shall be allowed for the total Examining Committee present.

6. The satisfactory completion of the residence requirement: The equivalent of at least one academic year of full-time graduate work must be spent at the University of Massachusetts. Three years beyond the bachelor's degree are required. Credits for each graduate course become invalid nine years following the date of completion of the course except that graduate credits previously earned which have been accepted by the Graduate Council for full credit toward the requirements of the Ph.D. degree shall become invalid nine years from the date of first registration in the Ph.D. program.

7. The payment of all fees and expenses.

PUBLICATION OF DISSERTATION

Following the granting of the doctorate, the Graduate School will have the dissertation microfilmed. The dissertation must be put into condition for publication on microfilm with as much care as if it were to appear in printed form and must have the approval of the student's doctoral committee. The student should supply to the Graduate School an original and one carbon copy of his dissertation, suitably bound. He should also provide an abstract, in triplicate, of less than 600 words.

The microfilm fee of $30.00 covers microfilm publication of the dissertation by University Microfilms, Inc., and the publication of the abstract by them in *Dissertation Abstracts.* The microfilm fee also covers the cost of copyright in the author's name. The dissertation will be catalogued in the Library of Congress and in the University of Massachusetts Library. Microfilm copies may be purchased from University Microfilms, Inc., Ann Arbor, Michigan.

Publication by microfilm does not preclude the printing of the dissertation in whole or in part in a journal or as a monograph.

Arrangements for microfilming may be made through the Graduate School.

COOPERATIVE PH.D. DEGREE

A cooperative Ph.D. program has been established by Amherst, Mount Holyoke and Smith Colleges and the University of Massachusetts. The

degree is awarded by the University of Massachusetts but some and perhaps much and in a few exceptional cases even all of the work leading to the degree might be done in one or more of the other institutions.

When a student has been awarded a degree under this program, the fact that it is a cooperative Ph.D. degree involving Amherst, Mount Holyoke and Smith Colleges and the University of Massachusetts will be indicated on the diploma, the permanent record card and all transcripts, as well as on the Commencement Program.

The requirements for the degree are identical to those for the Ph.D. degree at the University of Massachusetts except for the statement relating to "residence." For the cooperative Ph.D. degree "residence" is defined as the institution where the thesis work is being done.

When this catalog went to press, the following Departments were authorized to offer the Cooperative Ph.D. degree: all the Departments in the Biological Sciences; Chemistry, French, Geology, and German.

Students interested in this program should write to the Dean of the Graduate School.

CERTIFICATE OF ADVANCED GRADUATE STUDY

The School of Education conducts several programs leading to the Certificate of Advanced Graduate Study. These are not degree programs. These programs call for a minimum of sixty semester hours of graduate work beyond the Bachelors degree, of which at least thirty must be taken at the University of Massachusetts and of these at least fifteen must be taken in the School of Education. Of all the course work leading to the Certificate at least eighteen credits must be in 200 courses. No credit is valid after ten years and the last 30 credits must be taken within a four year period.

All fees and expenses must be paid before the Certificate will be conferred.

MASTER'S DEGREES

Master of Arts, Master of Science, Master of Science in Accounting, Master of Science in Finance, Master of Science in Agricultural Engineering, Master of Science in Chemical Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, Master of Science in Industrial Engineering, and Master of Science in Mechanical Engineering

The basic requirements for the above degrees are:

1. Thirty graduate credits, of which not more than six may be transferred from other institutions. Twenty-one of the thirty credits must be in the major field. Courses offered for minor credit only cannot be taken for major credit towards an advanced degree by students majoring in the department or non-departmentalized school concerned. If a thesis is offered, six credits must be earned in "200" series courses; if a thesis is not offered, twelve credits must be earned in "200" series courses. Not more than ten credits may be earned by means of a thesis. No credit is valid after six years.

2. The thesis is optional with the school or department, but if there is one, it shall be under the supervision of a committee appointed by

the Scholarship Committee of the Graduate Council. The thesis must be approved by the Thesis Committee and by the major department. A Master's degree candidate may sign up for credits in Thesis 300 for the second time providing he already has been assigned a Thesis Committee. First registration for Thesis 300 will be limited to three credits. The candidate must pass a general oral examination (not limited to the thesis topic) to be conducted by the Thesis Committee. If there is no thesis, the candidate shall take a general examination, written or oral, or both under the supervision of the head of his major department. If a student offers a thesis, problem courses shall be limited to six credits; if a thesis is not offered, the limit shall be nine credits.

3. All foreign language requirements are optional with the school or department.

4. All fees and expenses must be paid before the degree will be conferred.

Course credits used by any student for fulfilling the requirements for a Master's degree may not be used by the student for fulfilling the requirements for any other Master's degree at this University.

Master of Education

The degree is conferred upon graduate students who have met the following requirements:

1. Thirty to thirty-four credits. If 30 credits are offered, no more than six may be transferred from other institutions; if 34 credits are offered, no more than nine credits may be transferred from other institutions. Fifteen of the total credits must be in Education, and of these twelve credits must be earned in "200" courses. No credit is valid after six years.
2. The problem or Field Study is optional but if it is not chosen the total credits must be thirty-four. Credits in workshop and seminar courses are limited to six. The student must pass a comprehensive oral examination.
3. All fees and expenses must be paid before the degree will be conferred.

Master of Arts in Teaching

This is a cooperative program between the College of Arts and Sciences and the School of Education intended primarily for graduates of the upper quartile of approved liberal arts institutions who have had little or no course work in professional education. The student will register in the School of Education for either the secondary or elementary teaching program.

The special provisions are:

1. Secondary school program. Eighteen credit hours in the fundamental professional courses usually required for certification; at least twelve credit hours in some field in Arts and Sciences in which the student has the necessary background. Of these twelve credit hours six must be in "200" series courses.
2. Elementary school program. Twenty-four credit hours in the fundamental professional courses usually required for certification; at least

twelve credit hours in some field in Arts and Sciences of which six must be in "200" series courses.

3. For both groups the program should be undertaken in one year of residence or a year and a summer school session. For this degree no credit will be valid after two years.
4. All fees and expenses must be paid before the degree will be conferred.

Master of Business Administration

1. Candidates for the degree of Master of Business Administration must satisfactorily complete thirty semester hours of approved graduate work providing such students have completed their undergraduate degree with a major in Business Administration and/or Economics.

2. For those students who have not presented the undergraduate degree in Business Administration and/or Economics the School shall determine what courses will constitute adequate preparation up to a maximum of thirty additional semester hours.

3. The thesis is optional and students who complete a thesis will receive nine credit hours in lieu of elective course credit. Thesis candidates are required to pass an oral examination.

4. Non-Thesis candidates shall be required to pass a written comprehensive examination.

5. Applicants for admission are required to take the Admission Test for Graduate Study in Business given each year by the Educational Testing Service of Princeton, New Jersey. Applicants should apply to the Testing Service for further information.

6. Twenty-four credit hours of the thirty advanced credits required for the M.B.A. degree must be in courses designed exclusively for graduate students. These courses are in the "200" series.

7. Graduate Assistants register for a maximum of 12 credit hours each semester rather than the 15 hours permitted other students. Generally, Graduate Assistants complete their courses during a summer session period following a spring semester.

8. All expenses and fees must be paid before the degree will be conferred.

Master of Science

Beginning with the Fall semester, 1963, the School of Business Administration plans to have graduate programs in Accounting and in Finance. Later the School will offer the Master of Science degree in Marketing and in Management. This is in line with a recently established policy of the American Association of Collegiate Schools of Business of which this School is an accredited member. The Master of Business Administration degree is a general rather than a specialized degree.

Master of Landscape Architecture

The degree is conferred upon graduate students who have met the following requirements:

1. Work covering at least two years, of which a minimum of one and one-half years must be devoted to study in residence, and a minimum

of one-half year spent in practice. Specific requirements concerning the nature of such practice are determined by the department.

2. Submission of a written report on the work done in practice, or an oral examination conducted by the department staff.

3. The earning of not less than forty-five credits of which thirty shall conform essentially to the "fifth year program" (see page 105) the remainder to be selected from the "200" series on page 103, with minor deviations at the discretion of the department.

4. Preparation of a satisfactory thesis.

5. The passing of final examinations, written and oral.

6. All fees and expenses must be paid before the degree is conferred.

COURSES OFFERED

Courses available as major subjects for the degree of Doctor of Philosophy:

Agronomy
Animal Science
Botany
Chemistry
Economics
Entomology
Food Science and Technology
French
Geology
German
Government
Microbiology
Plant Pathology
Poultry Science
Psychology
Sociology
Zoology

Courses available as major subjects for a Master's degree:

Accounting
Agricultural and Food Economics
Agricultural Engineering
Agronomy
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Dairy and Animal Science
Economics
Education
Electrical Engineering
English
Entomology
Finance
Food Science and Technology
Forestry
Geology
German
Government
History
Home Economics
Horticulture
Industrial Engineering
Landscape Architecture
Mathematics
Mechanical Engineering
Microbiology
Philosophy
Physics
Plant Pathology
Poultry Science
Psychology
Public Health
Romance Languages
Sociology
Speech
Wildlife Management
Zoology

Courses available as minor subjects:

Accounting
Agricultural and Food Economics
Agricultural Engineering
Agronomy
Art
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Dairy and Animal Science
Economics
Education
Electrical Engineering
English
Entomology
Finance
Food Science and Technology
Forestry
Geology
German
Government
History
Home Economics
Horticulture
Landscape Architecture
Mathematics
Mechanical Engineering
Microbiology
Philosophy
Physical Education for Men
Physics
Plant Pathology
Poultry Science
Psychology
Public Health
Romance Languages
Sociology
Speech
Veterinary Science
Wildlife Management
Zoology

GENERAL STATEMENT

Graduate credit will be allowed for grades A. B, and C. Not more than six credits of C will be allowed for a Master's degree. Not more than twelve credits of C will be allowed for the Doctor of Philosophy degree. Thesis work is reported as either pass or fail. No graduate credit will be given for courses numbered below 100.

Course numbering system at the University of Massachusetts:

1-99 for undergraduate students. No graduate credit if elected by graduate students.
100-149 for graduate students only.
150-199 for both graduate and undergraduate students.
200-299 for graduate students only.

After registration is completed, courses may be added or dropped or changed from credit to audit only upon the approval of the student's adviser and the Dean of the Graduate School. The consent of the instructor also is necessary for the addition of courses. A graduate student may not register in any course more than eight days after the beginning of classes in any semester except on specific permission of the Graduate Dean and the payment of a late registration fee of $5.00. If the student is not passing a course at the time it is dropped, a failure will be recorded. No student, under any conditions, may drop a course after these dates: first semester, November 1; second semester, March 20, Summer School, two weeks from the beginning of the summer session, without a failure unless granted permission by the Scholarship Committee of the Graduate Council.

A student can obtain credit for an "incomplete" only by finishing the

work of the course before the end of the next semester (whether or not he is enrolled). The initiative in arranging for the removal of an "incomplete" rests with the student. This regulation does not pertain to problem or thesis credits.

Students in the Graduate School may be dismissed for failure to abide by the rules of the University.

The University reserves the right to make changes in the requirements for degrees without notice.

GRADUATE READING EXAMINATION IN FOREIGN LANGUAGES

1. A Graduate Reading Examination will be given by the German and Romance Language Departments upon written request from the head of the Department in which the student in question is doing his graduate work. The request should be sent to the head of the language department concerned, via the Dean of the Graduate School, *at least ten days before the examination is to be administered.*

2. The examination will be given three times during the academic year. The dates are:

1962-63	July (at the end of the summer session) November 30 or December 1 April 26 or 27
1963-64	July (at the end of the summer session) December 6 or 7 April 24 or 25
1964-65	July (at the end of the summer session) November 27 or 28 April 23 or 24

3. Prior to the administration of the reading examination the student may, if he and the representative of the language department agree, have a brief, informal interview so that it can be determined whether he has reached the point at which he is likely to deal competently with Ph.D. reading material in the foreign language.

4. The examination will be a written test of the student's ability to translate with mature comprehension from the foreign language into English. The use of a dictionary will be permitted.

5. The language examination shall consist of translation of

a) two passages of technical writing from the literature of the student's specialty,

or

b) one passage of technical writing and a passage of popular writing, for example, newspapers or periodicals

at the discretion of the Guidance Committee. Technical material shall be supplied by the student's major department, and popular material shall be mutually agreeable between the two departments.

After completion of the examination, the language department shall transmit the technical article (or articles), the language department's translation of it and the student's translation of it to the Guidance Committee for review and for a recommendation to the language department. The language department will then assign a grade to each part of the

examination, and the average of the two parts is to determine whether or not the student has passed. A grade of C or better is required for passing. The final grade in both parts of the examination is the sole responsibility of the language department.

6. A committee of three members of the language department concerned will grade the examination.

7. The Graduate Office, the head of the department requesting the examination, and the graduate student concerned will be notified within ten days of the examination whether the student has passed or failed.

8. In case of failure, a study period of at least four months will be required before a re-examination may be given, unless otherwise agreed upon. In the case of repeated failure, the candidate will not be admitted to the examination for the fourth time unless the language department concerned is satisfied that he has made adequate progress.

THESES

A thesis must be on a topic in the field of the candidate's major subject, and must indicate that its writer possesses the ability and imagination necessary to do independent constructive thinking. The following rules should be adhered to in the preparation and presentation of a thesis:

The objective of a thesis should be an attempt to make a real contribution to knowledge. When completed it should be of a quality worthy of publication as a contribution from the department concerned.

The thesis, in its completed form, will be judged largely upon the ability of the author to review literature and reach definite deductions; to formulate a problem, plan a method of attack, and work out a solution; and to summarize his material and draw conclusions. Scholastic attainment in writing and presenting the results of the study will also be an important factor in the evaluation. No thesis markedly poor in its English will be accepted.

A. Master's Theses:

Four copies of each master's thesis outline are to be transmitted to the Dean of the Graduate School by the Head of the Department in which the student is majoring. The letter of transmittal should contain the name of the professor within the department who is responsible for the direction of the student's research. This professor will be appointed the Chairman of the student's Thesis Committee. Other possible members of the Thesis Committee might be suggested in the letter of transmittal, but the Scholarship Committee of the Graduate Council has the responsibility of assigning all faculty members to Thesis Committees. If recommended by the head of the major department, two of the three members of the Thesis Committee may be members of the major department. Only members of the Graduate Faculty may be appointed to a Thesis Committee.

It is the responsibility of the chairman of the Thesis Committee to arrange a conference with other members of the Thesis Committee and the student for the purpose of discussing the research problem before approving the thesis outline. This should be done as soon as possible after the appointment of the Thesis Committee.

The fourth copy of the student's thesis outline is then to be signed

by each member of the Thesis Committee to indicate approval of the outline and to indicate the fact that a conference with the student has been held. The fourth copy of the thesis outline is then to be returned to the Dean of the Graduate School.

The outline for the thesis for the Master's degree must be presented not later than January first of the year in which the student expects to get the degree, or five months before he expects to complete the work for the degree.

B. Master's and Ph.D. Theses:

The Thesis Committee will have direct charge of all matters pertaining to the thesis, and it is recommended that the student use the advice available from this source in the progress of his research. The thesis must have the unanimous approval of this committee and of the major department before arrangements are made for the final examination for the degree.

Suitably bound copies of the thesis will be supplied to the Graduate School. An original and two copies are required for Master's theses and an original and one copy for Ph.D. dissertations. The student is responsible for the binding of the thesis.

If the thesis is printed, whether in periodical or book form, the fact that it is a thesis submitted for an advanced degree at the University of Massachusetts shall be explicitly stated in the title itself or as a footnote on the front page.

Because of the time required to give adequate consideration to the research conducted by the student, it is highly desirable that theses be submitted to the committee, in the case of doctor's theses, not later than March 15, and in the case of master's theses, not later than May 15 of the academic year in which the degrees are to be conferred. The theses in their final bound form shall be deposited with the Dean of the Graduate School by May 28. (September 1 for students planning to receive their degrees in the fall; February 1 for students planning to receive their degrees in the winter.)

If typewritten, whether designed for publication or to remain in the typewritten form, the size of the sheet, the arrangement of the title page, the general structure of the thesis, the character of the paper, and the binding must conform to definite standards.

A. *Size of sheet.* Size of sheet must measure $8\frac{1}{2}$ x 11 inches.

B. *Form of title page.* The title page should be distributed as artistically as possible and must be arranged in this order:
   a. Subject.
   b. Name of author.
   c. Degrees previously earned and names of institutions awarding them.
   d. "Thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of —."
   e. "University of Massachusetts, Amherst."
   f. Date.

C. Following the title page, the arrangement may take such form, variable of course with the subject matter, as is illustrated below:
   a. An analytical outline of the thesis.

b. An introductory statement in which the purposes of the author are set forth.
c. The body of the thesis composed of literature critically reviewed and deductions made, formulation of method of attack or procedure, and results secured. (All literature reviews and any work done by others should be so separated that no question can be raised as to which portion of the thesis represents the original investigation. It should be clearly kept in mind that *compilation* is not considered original investigation.)
d. Summary and conclusions.
e. Bibliography. (This should have the approval of the Chairman of the Thesis Committee before final arrangement.)
f. Acknowledgments.
g. Statements of approval signed by members of the Thesis Committee.

D. *Paper.* See sample in the University store.

All theses are the property of the University.

GRADUATE COURSES DURING THE SUMMER

The University offers opportunities to pursue graduate courses during the summer in connection with the Summer School. Details regarding courses offered, facilities for study, etc., may be found in the Summer School Catalog, a copy of which is available upon request to the Provost of the University.

COUNSELING SERVICE

The services of the Counseling Center are available to graduate students.

HEALTH SERVICES

Complete health care, financed by the student health fee, is available without additional charge to *all* students. The Infirmary, furnishing both in-patient and out-patient care, is located imediately north of Brooks Dormitory.

Students will find services are most complete and readily available during regular out-patient hours:

Weekdays	8:00 a.m.– 5:00 p.m.
Saturdays	8:00 a.m.–12:00 noon

Emergency care is available at all times, day or night.

If you need to stay in the Infirmary, an attempt will be made to provide an opportunity for you to study if you feel able. Student visitors will be allowed during specific hours; parents may visit at any reasonable hour.

The resources of the Health Services are available to you so that illness and loss of valuable school time will be minimized. We should be able to help you in finding a solution to your problems of health, physical or emotional. If you have questions, please visit the Infirmary and let us help you before your needs are serious.

PLACEMENT AND FINANCIAL AID SERVICES

The services of the Placement and Financial Aid Offices are available to all degree candidates.

HONORARY FELLOWSHIPS FOR VISITING SCHOLARS

Qualified scholars who may desire temporarily the privileges of the library and research facilities of the University, and who are not candidates for a degree may, upon recommendation of the Dean of the Graduate School and the approval of the President, be appointed Honorary Fellows without stipend.

Description of Courses

AGRICULTURAL AND FOOD ECONOMICS

Graduate Faculty: J. Blackmore, Head of Department, A. R. Bird, B. Crossmon, J. H. Foster, E. Jarvesoo, T. W. Leed, S. Russell.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Problems in Agricultural and Food Economics.—Investigations of problems in agricultural and food economics and firm management. Credit, 3.
The Staff.

202. Agriculture in the National Economy.—The application of economic theory, particularly macro-economics and welfare economics, to the determination of agricultural prices and income. The interdependency of agriculture and other sectors of the economy. Effects on agriculture of national, fiscal, and monetary policy. Credit, 3.
The Staff.

204. Advanced Food Marketing.—Market structure, prices, margins, efficiency, demand and supply analyses, theory of imperfect competition. Prerequisite, Agricultural Economics 155 or permission of Instructor. Credit, 3.
The Staff.

205. Research Methods in Agricultural and Food Economics.—Scientific method and its application. Selection, planning and conduct of research. Formulation of models and hypotheses. Interdisciplinary considerations. Techniques commonly used and promising new approaches. Evaluation of current research procedures. Research administration. Credit, 1-3.
The Staff.

275. Advanced Agricultural and Food Economics.—An intensive study of the theory of the firm as it applies to agricultural and food production, including: production functions, cost functions, programming, and decision-making principles; the nature of the aggregate supply functions in agriculture; applications of these principles to the agricultural firm and regional resource allocation, and to the distribution of income to and within agriculture. Prerequisite, permission of Instructor. Credit, 3.
The Staff.

300. Thesis, Master's Degree. Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

155. Marketing.—Relevant economic theory, types of marketing agencies, principal marketing functions, marketing costs and margins, price quotations and exchange operations, governmental regulations and the consideration of improvement proposals. Credit, 3.
Mr. Fitzpatrick.

AGRICULTURAL AND FOOD ECONOMICS

158. **Agricultural and Food Policy.**—Concept of policy, how made, and objectives. Economic, social and political aspects of alternative methods of solving the food surplus and income problems; consequences for farmer, businessman, consumer, and taxpayer. Other related national, state, and local problems. Special emphasis on New England problems.
Credit, 3.
Mr. Bird.

165. **Food Merchandising.**—The principles of buying, pricing and selling food products. Included is a study of the effects of store layout, product location, product mix, method of display, turnover, pricing, inventory control and promotion, upon food sales and profits and on costs of food to consumers. Credit, 3.
Mr. Leed, Mr. Marion.

168. **Food Distribution Economics.**—A critical analysis of the food industry. The effect of size, number and type of firms upon sales, operating costs, profits and level of performance of food wholesaling and retailing firms. Financing, site selection, and management as they affect performance of food distribution. Credit, 3.
Mr. Leed, Mr. Marion.

171. **Price Theory and Price Analysis.**—Methods of price analysis, techniques for study of seasonal, cyclical, and random fluctuations. Measurement of changes in demand and supply of farm products; mathematical, statistical and economic considerations in specifying models and associated estimation procedures. Credit, 3.
The Staff.

172. **International Policy in Agriculture.**—The impact of forces such as economic development, population increases, and the decline of colonialism on world agriculture. World trade in agricultural products; the influence of national agricultural policies on trade; international agricultural agencies. Credit, 3.
Mr. Foster.

175. **Production Economics.**—Applications of economic principles to agricultural production processes, input-output relations, factor and product prices, marginal concepts, cost concepts, factor and product combinations, elements of risk and uncertainty, the theory of the firm.
Credit, 3.
The Staff.

176. **Advanced Farm Management.**—Applications of the theory of the firm and modern decision theory to management problems of typical farm firms. Plans for alternative farm adjustments will be analyzed using budgeting and other methods. Credit, 3.
The Staff.

178. **Natural Resource and Conservation Economics.**—The influence of resource characteristics, and economic, social and legal institutions on the use of land, water, wildlife and other natural resources. Principles of resource conservation and development. 3 class hours. Credit, 3.
Mr. Foster.

195. **Seminar.**—Review of current literature and problems.
Credit, 3.
Mr. Blackmore.

STATISTICS

Statistics 177. Elementary Experimental Statistics.—An introduction to concepts and methods used in describing reliability and significance of statistics. Confidence limits of proportions and means, "chi square," "t," and "F," tests of significance and simple regression and correlation are the subjects covered. Students electing Statistics 177 may not take Statistics 179. Credit, 3.
Mr. Russell.

Statistics 179. Elementary Economics Statistics.—An introduction to measures of central tendency; dispersion; regression and correlation; time series analysis; and index numbers and an introduction to chance error in sampling as it applies to confidence limits, tests of significance and quality control. Students electing Statistics 179 may not take Statistics 177. Credit, 3.
Mr. Russell.

Statistics 180. Advanced Statistical Method.—Multiple regression and correlation, "chi square," "t," and "F," tests of significance. Prerequisite, Statistics 179. Credit, 3.
Mr. Russell.

AGRICULTURAL ENGINEERING

Graduate Faculty: R. W. Kleis, Head of Department, J. T. Clayton, G. A. Fitzgerald, C. A. Johnson, J. S. Norton, J. W. Zahradnik

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems. Credit, 1-6.
The Staff.

240. Advanced Farm Structures.—The application of structural theory in the development of high strength structures. The use of building materials and fastening for attaining diaphragms and prestressed components in the development of the structure.
The use of structural factors in the control of environment. Credit, 3.
Prerequisite, Permission of Instructor. Mr. Clayton.

241. Control of Heat and Vapor Flow in Agricultural Buildings and Processes.—Application of mass flow theory to heat and vapor transfer. Thermal and vapor interchange between environment and livestock controlling production rates of metabolic and respiratory heat. The application of instruments and controls. Credit, 3.
Prerequisite, Permission of Instructor. Mr. Clayton.

250. Unit Operations in Agriculture.—Machine rates and production standards in the handling of crops and food products. Plant layout and equipment for processing and storage. Energy requirements of alternate methods of processing. Credit, 3.
Prerequisite, Permission of Instructor. Mr. Zahradnik.

260. Agricultural Processing.—Heat, refrigeration, and vacuum in dehydrating, storing, and concentrating food products. Critical temperatures, latent heats, fermentation, respiration, and equilibrium moisture content, as they affect the processes and the end products. The application of instruments and controls. Credit, 3.
Prerequisite, Permission of Instructor. Mr. Zahradnik.

276. **Advanced Agricultural Machinery Design.**—Stress analysis, periodic vibration, and shock loadings, as related to design of agricultural machinery. The mathematical definition of tillage tool surfaces. Dynamics of suspension devices, automatic release equipment, and hydraulic systems. Credit, 3.
Prerequisite, Agricultural Engineering 76. Mr. Whitney

291. **Seminar.**—Research Methods in Agricultural Engineering. Credit, 1.
Mr. Kleis.

292. **Seminar.**—Research accomplishments in Agricultural Engineering. Credit, 1.
Mr. Kleis.

300. **Thesis, Master's Degree.** Credit, 4-8.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Agricultural Engineering)

151. **House Planning.**—Plan designs of the small house will be made. The arrangement of interior equipment, especially in the kitchen, and lighting, heating, water supply, and sewage disposal will be studied, together with a brief history of the house materials, construction methods, equipment, and architectural styles. Credit, 3.
Mr. Johnson.

181. **Elements of Food Engineering I.**—A study of the fundamental principles involved in the application of unit operations to food processing, including selection, management and operation of food processing equipment and instrumentation. Credit, 3.
Mr. Zahradnik.

182. **Elements of Food Engineering II.**—A continuation of course AE 181; a study of unit operations involved in processing foods including mixing, heating, refrigeration, evaporation, distillation, dehydration, and drying. Also the treatment and handling of final products. Credit, 3.
Prerequisite, Agricultural Engineering 181. Mr. Zahradnik.

AGRONOMY

Graduate Faculty: W. G. Colby, Head of Department, J. H. Baker, M. Drake, L. Michelson, J. Vengris, M. E. Weeks.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. **Special Problems.** Credit, 3 or 6.
The Staff.

216. **Forage Crops.**—The regional distribution, the cultural requirements and the utilization of the principal forage crops grown in the U. S. 1958-59 and each alternate year. Credit, 3.
Mr. Colby.

263. **Chemistry of the Soil.**—The chemistry of soil formation, soil acidity, nutrient element availability, ionic exchange, and fixation, soil-plant-microorganism relationships, and of organic matter of the soil will be

discussed. The laboratory work will consist of physical, analytical and biochemical investigations of soils and important soil constituents.
Credit, 3.
Mr. Baker.

264. Experimental Methods in Agronomy.—Some of the concepts of the application of statistics to the analysis and interpretation of data obtained in agricultural research. Such points as choice of field, design of experiments, effect of competition, interpretation of results, and other special factors that need to be considered in well-planned experiments are discussed. Credit, 3.
Mr. Yegian.

290. Seminar. Credit, 1 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

152. Forage and Field Crops.—Analysis of the principles involved in the establishment, fertilization, and harvest management of forage and field crops. Credit, 3.
Two class hours, one 2-hour laboratory period. Mr. Colby.

153. Agrostology.—The establishment and maintenance of turfgrasses used on lawns, athletic fields, highways, airports and cemeteries. Credit, 3.
Two class hours, one 2-hour laboratory period. Mr. Troll.

160. Soil-Plant Mineral Nutrition.—A study of mineral nutrients in the growth of plants; the use of fertilizers and other soil amendments; soil reaction; mineral deficiencies and toxicities in plants. Credit, 3.
Two class hours, one 2-hour laboratory period. Mr. Drake.

165. Ecology and Control of Weeds.—Identification and ecology of common weeds and principles of weed control with special emphasis on the use of chemical herbicides. Credit, 3.
Three class hours. Mr. Vengris.

Soil Science

157. Soil Formation.—The development of soils as related to physical, chemical, biological, climatic and geological factors. Credit, 3.
Three class hours. Mr. Southwick.

179. Soil Physics (1962-1963).—Physical properties of soil, including textural, structural, water, air and temperature relationships; their measurement, evaluation and influence in the soil system.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, Soil Science 22 or equivalent. Mr. Waddington.

184. Soil Chemistry (1963-1964).—The inorganic and organic chemical reactions related to the nutrient supply in soils and soil nutrition of plants. Colloidal aspects of soil chemical reactions and soil-plant mineral relationships.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 29, 30, Botany 168, Soil Science 157. Mr. Baker.

ART

COURSES FOR MINOR CREDIT ONLY

151, 152. Water Color. Credit, 3 each semester.

153, 154. Oil Painting. Credit, 3 each semester.

157, 158. Printmaking. Credit, 3 each semester.

160, 161. Sculpture. Credit, 3 each semester.

171. Ancient Art and Archaeology. Credit, 3.

173. Medieval Art. Credit, 3.

175. Renaissance Art. Credit, 3.

176. Baroque Art. Credit, 3.

177. American Art. Credit, 3.

179. Modern Painting and Sculpture. Credit, 3.

181. Modern Architecture. Credit, 3.

BOTANY

Graduate Faculty: R. B. Livingston, Acting Head of Department, H. E. Bigelow, M. E. Bigelow, E. L. Davis, A. C. Gentile, R. B. Livingston, J. R. Rowley, R. M. Schuster, R. T. Wilce.

Candidates for the Degree of Master of Arts and for the Degree of Doctor of Philosophy are accepted for admission under the general regulations of the Graduate School. Admission to advanced courses does not imply admission to candidacy for an advanced degree. Only students whose knowledge of botany and related chemical and physical sciences is considered by the Department to be adequate will be accepted as candidates for advanced degrees. Research work leading to the thesis may be selected from the fields of cytology, ecology, mycology, morphology, physiology, systematics, anatomy and histology.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Research not expected to terminate in a thesis; advanced study in special subjects. Credit, 1-5 each semester.
The Staff.

202, 203. Advanced Plant Physiology.—Selected topics in plant physiology.
Lectures, laboratory, and individual conferences.
Prerequisites, Botany 167 and 168 and one semester of Organic Chemistry.
Credit, 2-4 each semester.
Mr. Gentile.

205. Seminar. Credit, 1 each semester.
Maximum credit, 6.
The Staff.

206. Advanced Plant Morphogenesis.—Lectures, discussions and reading on the development of the plant body. Credit, 3.
Prerequisites, Botany 157 or 159, Botany 167 or equivalent. Mr. Davis.

207. Advanced Plant Ecology.—Lectures, conferences, critical reading and reports on advanced considerations of synecology and autecology.
Credit, 3.
Mr. Livingston.

209. Advanced Mycology.—Systematics and ecology of the higher ascomycetes and basidiomycetes; problems in growth and nutrition of fungi.
Credit, 3.
H. E. Bigelow and M. E. Bigelow.

210. Advanced Phycology.—Detailed study of marine and freshwater algae with emphasis on phylogeny, life histories and ecology. Credit, 3. Prerequisite, Botany 161 or equivalent. Mr. Wilce.

214. Fossil Tracheophytes.—Detailed study of anatomy and reproductive histology of those fossil forms which best represent the phylogeny of vascular plants. Credit, 3.
Mr. Putala.

215. Palynology.—Development and comparative morphology of contemporary pollen grains and spores. Description and/or identification of modern and fossil pollen and spores with attendant laboratory and field techniques. Consideration is given to application of palynology in research, industry, and public health. Credit, 3.
Mr. Rowley.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Total credit determined by Guidance Committee.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

157. Plant Anatomy and Histological Methods.—Study of origin and structure of vegetative and reproductive organs of seed plants coordinated with exercises in preparation of stained slides for microscopic studies.
Credit, 4.
Mr. Putala.

159. The Angiosperms.—The evolution and systematics of flowering plants, emphasizing families and their relationships. Credit, 3.
Mr. Schuster.

160. Morphogenesis.—Development of form and structure at the level of cellular differentiation. Credit, 3.
Mr. Davis.

161. Phycology.—Designed to give insight into the phylogeny, taxonomy, morphology and ecology of the major groups of the marine and fresh water algae. To include field work in both marine and fresh water environments. Credit, 3.
Mr. Wilce.

162. The Archegoniates.—The morphology, evolution and systematics of bryophytes, ferns and their allies. Credit, 3.
Mr. Schuster.

166. General Mycology.—Survey of the various fungi, their life history and distribution, their significance in disease, their utilization by man. Credit, 3.
Mr. Bigelow.

167. Introductory Plant Physiology.—Plant processes and their relation to the complex of activity constituting plant growth. Topics include water relations, photosynthesis, fat and protein synthesis, digestion, translocation and respiration. Credit, 3.
Mr. Gentile.

168. Plant Metabolism.—A study of the chemical operation of plants, emphasizing the enzymatic processes involved in the synthesis and breakdown of the more important chemical constituents of plants. Credit, 4.
Mr. Gentile.

178. Plant Growth.—Internal and environmental factors influencing plant growth with emphasis on the role of hormonal regulation and enzyme localization in relation to growth and development. Credit, 3.
Mr. Van Fleet and Mr. Gentile.

181. Plant Ecology.—Interrelationships between plants and their environment, with special emphasis on the structure and development of plant communities. Credit, 3.
Mr. Livingston.

182. Plant Geography—Principles governing the development and natural distribution of plants and plant communities with special consideration of the vegetation of North America. Credit, 3.
Mr. Livingston.

184. Autecology.—Plant behavior in relation to the physical and biological environment, with emphasis on the ecology of individual plants. Prerequisites, Botany 167 and 181. Credit, 3.
Mr. Livingston.

189. Developmental Plant Cytology.—Emphasis on development of plant cell walls, plastids and mitochondria; introduction to fine structure of cytoplasmic and nuclear components and ontogenetic and phylogenetic development of plant cell structures. Credit, 3.
Mr. Rowley.

BUSINESS ADMINISTRATION

Graduate Faculty: H. B. Kirshen, Dean, P. L. Cheng, H. E. Hardy, J. B. Ludtke, F. A. Singer.

The program of graduate courses in Business Administration is designed to prepare for positions of responsibility in business, in organizations that serve business, in government, and in related fields of teaching.

The School of Business Administration is an accredited member of the American Association of Collegiate Schools of Business.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Courses 203, 211, 222, 230, 242, 251 and 271 are required of all students who expect to receive the M.B.A. degree.

One of the elective courses must be in the "200" series, courses designed for graduate students only.

200. Problems in Business Administration.—Independent study and research on selected problems in Business Administration. Permission of the instructor and the dean required. Credit, 3 each semester.
THE STAFF.

203. Case Analysis and Report Writing.—Concentrated study in the practice and analysis of business problems and in the writing of formal reports through the means of cases. Credit, 3.
MR. LUDTKE.

211. Accounting in Management.—The production and use of accounting and other quantitative data for decision-making related to planning and control. Credit, 3.
MR. SINGER.

222. Marketing Management.—The broad aspects of product planning and choice of channels of distribution; promotional problems; the interrelations between research, planning, execution and control of marketing activities. Credit, 3.
MR. HARDY.

230. Financial Management.—A case approach to business problems from the point of view of the financial manager. Credit, 3.
MR. CHENG, MR. LUDTKE.

242. Organizing for Production.—Situations which confront executives in charge of manufacturing operations and the direction of people at work. Designed to develop skill in analyzing production processes and to determine specific adaptations of production and personnel techniques to the requirements of differing processes. Credit, 3.
MR. CLAUNCH.

251. Principles and Policies of Administration.—An advanced course in the Theory of Business Administration, including the generic functions of management, organization theory, and systematic corporate decision making. Credit, 3.
MR. O'DONNELL.

252. Administrative Practices.—The application of principles of management to the analysis and the solution of actual integrative cases, with practice in policy formulation and managerial decision making. Credit, 3.
MR. O'DONNELL.

271. Seminar in Business Administration I.—A critical and intensive study of selected problems in the field of business. Credit, 3.
MR. KYLER.

300. Thesis, Master's Degree. Credit, 9.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

Accounting

162. Advanced Accounting.—A continuation of Accounting 61, concerned with the valuation of assets and liabilities, accounting for net worth, statements of application of funds and the analysis of financial statements. Credit, 3.
MR. FITZGERALD.

164. Advanced Cost Accounting.—A continuation of the theory and practice of cost accounting with emphasis on standard, estimated, and distribution costs. Credit, 3.
Mr. Lentilhon.

174. C.P.A. Problems.—Extensive practice in solution of problems from C.P.A. examinations. Topics covered include governmental and institutional accounting, estates, trusts, receiverships, liquidations and consolidations. Credit, 3.
Mr. Anderson.

177. Auditing.—The verification of accounting records dealing with audit theory and procedure. Credit, 3.
Mr. Krzystofik.

178. Advanced Federal Tax Procedures.—Advanced phases of Federal taxation with particular attention to inventories, depreciation, and accounting methods. Study and preparation of returns for partnerships, corporations, estates and trusts; Federal estate and Federal gift taxes. Prerequisite, Accounting 73. Credit, 3.
Mr. Anderson.

190. Theory of Accounts.—A survey of the development of Accounting Principles or Standards followed by an intensive study of the controversial aspects of income determination and the presentation of a firm's financial position. Credit, 3.
Mr. Singer.

General Business and Finance

166. Traffic Management.—The relationships and responsibilities among carriers, regulatory authorities and users of transportation services. Credit, 3.
Mr. Rivers.

172. Business Law II.—The law of agency and negotiable instruments; bankruptcy and wills. Credit, 3.
Mr. Smart.

173. Business Law III.—The law of partnerships, corporations, real and personal property. Credit, 3.
Mr. Burak.

178. Administrative Statistics.—Probability and statistical distributions applied to business management problems; application of Bay's theorem to sampling for business decision-making under uncertainty. Credit. 3.
Mr. Cheng.

181. Problems in Business Finance I.—Short- and intermediate-term financing; estimating requirements for funds and the major types of loan arrangements. Credit, 3.
(Not open to MBA candidates.) Mr. Cheng.

182. Problems in Business Finance II.—Long-term financing; capital budgeting; leasing; reserves and dividend policy; pensions; company expansion; mergers and acquisitions and reorganizations. Credit, 3.
(Not open to MBA candidates.) Mr. Cheng.

183. **Investments.**—The principles and techniques that are useful for the analysis and selection of investment media; investment policies of individuals and institutions. Credit, 3.
Mr. Ludtke.

184. **Security Analysis.**—An examination of the factors effecting investment values of securities and the methods used in their analysis. Students are required to select one industrial group for intensive investigation.
Credit, 3.
Mr. Ludtke.

Management

167. **Management and Union Relations I.**—A comparison of union-management objectives, functions and structures including the scope and impact of union penetration into areas of management authority.
Credit, 3.
Mr. Conlon.

168. **Management and Union Relations II.**—A study of the human relations problems encountered in the interpretation and administration of collective bargaining agreements. Credit, 3.
Prerequisite, Management 167. Mr. Conlon.

181. **Theory of Business Administration.**—The philosophy and theoretical context of administration, corporate objectives, standards, plans, policies, responsibility, authority, line-staff relations, communications, and morale.
Credit, 3.
Mr. O'Donnell.

Marketing

176. **Purchasing.**—Purchasing by industrial establishments, with emphasis on case problems in purchasing organization and practices.
Credit, 3.
Mr. Zane.

179. **Wholesaling.**—The field of wholesaling, types and classes or organization including newer developments. The performance of purchasing and selling functions by wholesalers and manufacturers are considered in case problems. Credit, 3.
Prerequisite, Marketing 53. Mr. Zane.

180. **Problems in Marketing.**—Cases in Marketing Management; analysis, in depth, of questions concerning the interrelations of marketing functions including merchandising, distribution channels, pricing, and marketing research applied to specific companies and products. Credit, 3.
Prerequisite, Marketing 53. Mr. Drew-Bear.

182. **Problems in Retailing.**—Case analysis and decisions covering pricing; merchandise management; buying and selling policies; store systems; personnel; accounting control and plant operation. Credit, 3.
Prerequisite, Marketing 53. Mr. Drew-Bear.

184. **Problems in Advertising.**—The applications of procedures for planning campaigns including marketing research appropriations, choice of media, scheduling, preparation of copy and layout. Credit, 3.
Prerequisites, Marketing 53 and 73. Mr. Hardy.

CHEMICAL ENGINEERING

Graduate Faculty: J. W. Eldridge, Head of Department, K. D. Cashin, D. C. Chappalaer, H. C. Duus, E. E. Lindsey, J. F. Welch.

The graduate course in Chemical Engineering is designed to emphasize advanced study in engineering fundamentals rather than specific technological applications.

To be admitted to full graduate study in this field either of the following requirements should be met:

1. Applicant must have a Bachelor's Degree in Chemical Engineering from a recognized school or,

2. Applicant must show satisfactory academic training or demonstrate proficiency in these subjects as a minimum:

Mathematics: through calculus.
Chemistry: Organic, Analytical, Physical.
Engineering Mechanics: Statics, Strength of Materials.
Chemical Engineering: Stoichiometry, Unit Operations, Thermodynamics (including thermodynamics of chemical change).
Electrical Engineering: elements of circuits and machines.

Required Courses

1. Ch.E. 300, Thesis, maximum 10 credits.
2. At least four of the following courses:
   Ch.E. 201, 222, Thermodynamics, or Physics 185, 186 (Nuclear Option).
   M.E. 221, Heat Transfer, Ch.E. 222, Advanced Heat Transfer.
   Ch.E. 211, Advanced Chemical Engineering.
   Ch.E. 231, 232, Mass Transfer.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201. Chemical Engineering Thermodynamics I.—A review of the fundamental laws of thermodynamics, P-V-T relations of fluids, thermodynamic functions, fluid flow, compression and expansion of gases, liquefaction and separation of gases. Credit, 3.
Prerequisite, Chemical Engineering 181 or equivalent.
Mr. Duus or Mr. Eldridge.

202. Chemical Engineering Thermodynamics II.—Phase equilibria and chemical reaction equilibria and their applications in chemical processing. Prerequisites, Chemistry 166 and Chemical Engineering 181. Credit, 3.
Mr. Duus or Mr. Eldridge.

205. Chemical Reactor Design.—Study of the principles of chemical reaction kinetics and their application to industrial chemical processes. Systems homogeneous and heterogenous, batch and flow, catalyzed and uncatalyzed, isothermal and adiabatic are discussed. Credit, 3.
Prerequisites, Chemistry 166, Mathematics 32 or 92 or equivalent.
Mr. Chappelaer.

211. Advanced Chemical Engineering.—Introduction to advanced work in chemical engineering which applies the transport of momentum, of energy, and of material. Background for fluid flow, heat transfer and mass transfer. Topics covered include: viscosity, thermal conductivity and

diffusivity, momentum and energy balances, friction, turbulence, fluid friction, the motion of suspended solids in fluids, and non-Newtonian fluids. Credit, 3.
Prerequisite, Chemical Engineering 156. Mr. Lindsey.

222. Advanced Heat Transfer II.—This course is designed for those graduate students who wish to continue the study of heat transfer beyond that presently offered in M.E. 221. The work load is evenly divided between theory and design. Subjects covered include natural and forced convection, heating and cooling both inside and outside of tubes, condensing vapors, boiling liquids and fluidized systems Credit, 3.
Prerequisite, Mechanical Engineering 182 or Chemcal Engineering 178.
Mr. Cashin.

231. Mass Transfer I.—Theories of diffusion leading to unified treatment of mass-transfer unit operations: molecular and eddy diffusion, mass-, heat-, and momentum transfer analogies, two film theory, diffusion in turbulent flow and related topics. The last third of the course deals with applications of these principles to general gas-liquid operations.
Prerequisite, Chemical Engineering 156. Credit, 3.
Mr. Cashin.

232. Mass Transfer II.—A continuation of course 231. Application of principles to design factors in distillation, gas absorption, adsorption and ion exchange and liquid-liquid extraction. Other unit operations may be substituted for the above depending on the interests of the class. Credit, 3.
Prerequisite, Chemical Engineering 231. Mr. Cashin.

281. Nuclear Chemical Engineering.—Application of chemical engineering to the preparation of nuclear fuels: the recovery and reprocessing of reactor fuels, the preparation of moderator materials, and the disposal of radioactive wastes. Credit, 3.
Prerequistite, Chemical Engineering 183. Mr. Lindsey.

300. Thesis, Master's Degree.—A theoretical or experimental study of some chemical engineering problem. Credit will be determined by the work done, and by agreement with the Department and the Graduate Thesis Committee. Credit, 8-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

159. Introduction to Analog and Digital Computers.—An introduction to the principles of machine computation processes. Emphasis is on practice in writing programs and running them on analog and digital computers. Necessary mathematical background for the machine computation, such as numerical analysis, will be included. This course is designed for any students interested in machine computation. Credit, 3.
Prerequisite, Math 32 or equivalent. Mr. Kim.

161. Chemical Engineering Analysis.—Application of mathematical techniques to chemical engineering problems. The emphasis is on analysis of problems and the devising of satisfactory mathematical models. A part of the course is devoted to study of machine computation with digital and analog devices. Credit, 3.
Prerequisites, Chemical Engineering 159 or permission of instructor.
Mr. Kim.

176. **Automatic Process Control.**—A study of the theoretical and practical factors governing automatic control of industrial processes. Topics include control systems, measurement devices, control modes, mathematical relationships and laboratory work. Credit, 3.
Prerequisites, Chemical Engineering 56, Math 32. Mr. Cashin

178. **Advanced Unit Operations.**—A more detailed study of certain unit operations, especially heat transfer. Credit, 2.
Prerequisite, Chemical Engineering 156. Mr. Cashin.

182. **Industrial Equilibria and Kinetics.**—Phase and chemical equilibria and rates of reaction in chemical processes from the industrial point of view. Credit, 3.
Prerequisites, Chemistry 166 and Chemical Engineering 181. Mr. Duus.

183, 184. **Survey of Nuclear Engineering I, II.**—An introduction to the principles of nuclear physics and a survey of problems involved in the design and operation of nuclear reactors. Heat transfer, shielding, metallurgy, controls, waste disposal and health physics.
Two lectures, one laboratory period per week each semester.
Credit, 3 each semester.
Prerequisites, two semesters of chemistry and mathematics through integral calculus. Mr. Marcus

187. **Process Equipment Design.**—The design of process equipment for the chemical industries: riveted pressure vessels, welded pressure vessels, piping, attachments and closures, etc. Credit, 2.
Prerequisites, Chemical Engineering 155 and Civil Engineering 53.
Mr. Lindsey.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Chemical Engineering)

155. **Unit Operations I.**—The fundamental principles underlying the unit operations of fluid flow, heat transfer, and evaporation; the thermodynamic properties of matter.
Three class hours; one 3-hour computation period. Credit, 4.
Prerequisites, Mathematics 30 or 31 and Chemistry 30. Mr. Cashin.

156. **Unit Operations II.**—A continuation of course 155 concerning distillation, gas absorption, liquid-liquid extraction, filtration and, if time permits, size reduction and separation.
Three class hours; one 3-hour computation period. Credit, 4.
Prerequisite, Chemical Engineering 155. Mr. Cashin.

158. **Organic Chemical Technology.**—Some unit processes involved in the manufacture of organic chemicals; e.g., nitration, amination, halogenation, oxidation. Credit, 3.
Prerequisite, Chemistry 51. Mr. Duus.

177. **Elements of Unit Operations.**—An introduction to some of the unit operations of process industries, with emphasis on principles and types of equipment, rather than on quantitative aspects and design.
Credit, 3.
Prerequisites, Chemistry 30, Physics 25 and 26.
Mr. Duus and Mr. Lindsey.

181. **Heat-Energy Relations.**—Energy relations in chemical processes, types of energy, energy balances, second law, thermodynamic functions, including: P-V-T relations of fluids, compression and expansion processes. Three class hours. Credit, 3.
Prerequisite, Chemistry 166. Mr. Duus.

188. **Chemical Engineering Laboratory.**—A quantitative study of pilot plant size equipment illustrating some unit operations with special emphasis on the securing of accurate data, correct operating technique, and report writing. Field trips when possible. Credit, 3.
Prerequisite, Chemical Engineering 156. The Staff.

CHEMISTRY

Graduate Faculty: W. E. McEwen, Head of Department, E. Bennett, J. F. Brandts, G. W. Cannon, L. A. Carpino, J. A. Chandler, J. W. George, I. M. Hunsberger, H. N. Little, E. J. McWhorter, E. M. Mortensen, J. W. Olver, J. E. Roberts, T. Robinson, R. L. Rowell, J. H. Smith, R. S. Stein, H. D. Stidham, R. M. Williams, O. T. Zajicek.

The Department of Chemistry provides facilities for students intending to complete the requirements for the Master's degree and the Doctor's degree. Students accepted for graduate study are expected to have met the usual requirements for the Bachelor's degree. Those who have not fulfilled these requirements may be admitted as special students until the deficiencies have been removed.

First year graduate students will take placement examinations during the first week of residence. These examinations are for the purpose of evaluating the background of the student, and to assist in the selection of a course of study. Students are admitted to candidacy for a degree only after the completion of qualifying requirements. A research problem is carried out in one of the following fields of chemistry: physical, organic, inorganic, analytical, and bio-chemical.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201. **Inorganic Preparations.**—Laboratory.—The preparation and testing of various types of inorganic substances, to teach important techniques and give familiarity with the reactions and properties of inorganic materials. Credit, 3-5.
Inorganic Staff.

202. **Inorganic Chemistry of the Less Familiar Elements.**—Lectures and collateral reading on the descriptive chemistry of some of the less familiar elements such as boron, gallium, indium, thallium, the lanthanides, fluorine, titanium, vanadium, tantalum, tungsten, and uranium, with correlations between structure or spatial configurations and chemical properties. Credit, 3.
Given in alternate years. Mr. Roberts.

203. **Physical Chemical Measurements.**—Laboratory.—Experiments selected from standard texts and from the literature in Physical Chemistry to meet the needs and background of the individual student. Credit, 3-5.
Prerequisites, Chemistry 165 and 166 or equivalent. The Staff.

205. Chemical Thermodynamics.—Introduction to Statistical Thermodynamics. Applications of Microcanonical, Cononical, Grand Canonical and Generalized Ensembles to chemical systems. Calculation of thermodynamic functions from spectroscopic data, fluctuations, imperfect gases, nearest neighbor lattice statistics and other special topics of current interest.
1962-63 and each alternate year. Credit, 3.
Prerequisites, Chemistry 177 or equivalent. Mr. Stidham.

207. Chemical Spectroscopy, Technique and Applications.—Contains an introduction to the elementary theory, experimental techniques and interpretation of data obtained in applications of infrared, Raman, visible, ultraviolet, nuclear quadrupole and nuclear magnetic resonance spectroscopy to the solution of chemical problems. Credit, 3.
Prerequisite, Chemistry 66 or equivalent. Mr. Stengle and Mr. Stidham.

208. Chemical Spectroscopy.—Theory. Contains an introduction to the theory of infrared, Raman, visible and ultraviolet, nuclear quadrupole and nuclear magnetic resonance spectroscopy.
1963-64 and each alternate year. Credit, 3.
Prerequisites, Chemistry 207 and Mathematics 91, or permission of the instructors. Mr. Stidham and Mr. Stengle.

211, 212. Quantum Chemistry.—Quantum mechanics and its application to chemical problems. A discussion of the exact theory of structure of simple atoms, the application of approximate methods for complex atoms and molecules, the chemical bond, resonance, the interaction of radiation and matter, group theory.
1963-64 and each alternate year. Credit, 3 each semester.
Prerequisite, Chemistry 186 or equivalent.
Mr. Stein, Mr. Stengle, Mr. Stidham.

215. Topics in Physical Chemistry.
Prerequisites, Chemistry 177, 186 or equivalent. Credit, 2 each semester.
Maximum Credit, 6.
The Staff.

216. Topics in Inorganic Chemistry.—Topics such as coordination chemistry, non-aqueous solvents, less familiar oxidation states, acid-base theories, reaction mechanisms, etc. will be offered.
Prerequisite, Chemistry 186 or equivalent. Credit, 2 each semester.
Maximum Credit, 6.
The Staff.

218, 219. Physical Chemistry of High Polymers.—Structure of solid polymers, determination of molecular weights, sizes and shapes, mechanical properties of solid polymers, colligative properties of polymer solutions, polyelectrolytes, and physical chemistry of proteins.
1963-64 and each alternate year. Credit, 3 each semester.
Prerequisite, Chemistry 205 or equivalent. Mr. Stein.

221. Advanced Analytical Chemistry.—Laboratory consisting of special work to meet the needs of the individual students. Credit, 3-5.
Prerequisite, Chemistry 183 or equivalent. The Staff.

223. Introduction to Micro-Chemistry.—Laboratory.—The applications of micro technique to synthesis, analysis, and characterization; the microscopic work may include the optics of the microscope, micrometry, the microscopic study of fibers, crystals, and physiochemical phenomena and

an introduction to microscopical qualitative analysis; the quantitative work may include the determination of carbon, hydrogen, nitrogen, and halogens in organic materials and selected inorganic determinations.
Credit, 3-5.
Prerequisite, Chemistry 183 or equivalent. THE STAFF.

227. Heterocyclic Chemistry.—The chemistry of the common organic heterocyclic compounds containing nitrogen, oxygen, and sulfur. Consideration of mechanisms of the reactions discussed. Credit, 3.
Prerequisite, Chemistry 181 or equivalent. THE STAFF.

229, 230. Theoretical Organic Chemistry.—Lectures on special topics such as stereochemistry, bond formation, resonance, ionic reactions, free radical reactions, transition state theory, reaction mechanisms, molecular rearrangements, etc.
1962-63 and each alternate year. Credit, 3 each semester
Prerequisite, Chemistry 181 or permission of instructor. THE STAFF.

231. Advanced Organic Chemistry.—Laboratory.—More difficult synthesis of organic compounds, frequently those desired as starting materials for research, will be assigned to the individual student. Their preparation will require the use of the original literature. Credit, 3-5.
Prerequisite, a year course in Organic Chemistry. THE STAFF.

232. Organic Chemistry.—An intensive survey of certain reactions of organic chemistry with emphasis on their scope and limitations, recent developments, and mechanisms. Credit, 3.
Prerequisite, Chemistry 181. THE STAFF.

233. Special Topics in Organic Chemistry.—One to three topics of current interest will be discussed in detail. Recent development of theoretical and/or synthetic importance to organic chemistry will be covered. A maximum of six credits may be taken.
Prerequisite, Chemistry 181 or permission of instructors. Credit, 3.
Three class hours. THE STAFF.

234. Special Topics in Biochemistry.—One to three topics selected from those areas of biochemistry which currently are most significant will be discussed in detail.
A maximum of six credits may be taken. Credit, 3-6.
Prerequisites, Chemistry 193 and 194. BIOCHEMISTRY STAFF.

235. Advanced Biochemical Techniques.—A laboratory course to provide experience in the isolation, identification, and analysis of biochemical compounds. Credit, 2-5.
Prerequisites, Chemistry 193 and 194. BIOCHEMISTRY STAFF.

236. Experimental Enzymology.—A course designed to give experience in the preparation and assay of enzymes. Credit, 2.
Prerequisites, Chemistry 193 and 194. MR. ROBINSON.

237. Biocolloids.—The fundamental principles of colloidal behavior and some applications to industry and biology. Credit, 3.
Prerequisite, Chemistry 152 or equivalent. MR. BENNETT.

238. Biochemistry of Proteins.—A discussion of the chemical, physical and biological properties of proteins. Credit, 3.
Prerequisites, Chemistry 194 and 166. MR. LITTLE.

239. Chemistry of Natural Products.—Natural products of current interest, primarily from the steroid, terpene, and alkaloid groups, with emphasis on structural proofs, stereochemistry, synthesis, and biogenetic relationships.
1962-63 and each alternate year. Credit, 2.
Prerequisite, Chemistry 181 or permission of instructor. THE STAFF.

251. Seminar.—Conferences, reports or lectures.
Credit, 1 each semester.
Maximum credit, 2.
MR. STEIN.

295. Research Problem.—The student will prepare two proposals for research problems not directly related to his thesis topic if the latter has been selected. The problems will involve primarily library research. Required of all candidates for the Ph.D. in Chemistry and must be completed before the candidate's preliminary examination for the degree.
Credit, 4.
THE STAFF.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATES AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

177. Advanced Physical Chemistry.—Topics such as chemical thermodynamics, statistical mechanics, introductory quantum chemistry and theories of gases, liquids and solids.
Three class hours. Credit, 3.
Prerequisites, Chemistry 165 and 166. MR. STENGLE AND MR. STIDHAM.

181. Organic Chemistry.—An intensive survey of aliphatic and aromatic chemistry with emphasis on scope and limitations of reactions, mechanisms, and recent developments. Credit, 3.
Three class hours. THE STAFF.
Prerequisites, one year of Organic Chemistry and permission of instructor.

182. Qualitative Organic Chemistry.—Identification of unknowns, both single and mixtures of organic compounds, by physical properties, reactions and preparation of derivatives. Credit, 4.
Two class hours; two 3-hour laboratory periods. THE STAFF.
Prerequisites, one year of Organic Chemistry and permission of instructor.

183. Advanced Analytical Chemistry.—The theory and techniques of special methods of analysis such as colorimetry, potentiometry, microscopy, ion exchange, electro-deposition and other recently developed methods of analysis.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 30 and 166. THE STAFF.

184. Radiochemistry.—The character of atomic nuclei, nuclear reactions, radiation and its detection, and techniques for the study and utilization of radionuclides.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, Chemistry 30 or permission of instructor. MR. RICHASON.

185. Theory of Analytical Processes.—A detailed consideration of analytical topics having general applicability in chemical investigations. Among the areas included are chemical equilibrium, precipitate formation, chelating agents, multistage separation, and quantitative methods for organic functional groups. Additional topics may be selected from the current literature. A one credit-hour laboratory will be available on an individual and optional basis.
Pre- or co-requisites—Chemistry 52 and 66.
Three class hours. Credit, 3.
One afternoon laboratory (optional). Credit, 1.
THE STAFF.

186. Theoretical Inorganic Chemistry.—A theoretical survey of inorganic chemistry based on periodic relationships. Topic includes: atomic structure, nuclear chemistry, valence concepts, coordination compounds and acid-base theory.
Three class hours. Credit, 3.
Prerequisite, Chemistry 165. MR. SMITH.

187. Inorganic Chemistry of the Common Elements.—A systematic consideration of the chemistry of the common elements and their compounds, based on the periodic relationships and modern concepts of structure and bonding. An optional two-credit laboratory will provide an introduction to inorganic laboratory techniques and practices.
Three class hours (6 lab hours optional). Credit, 3 (5).
Prerequisite, Chemistry 186 or permission of the instructor.
MR. ZAJICEK AND MR. CHANDLER.

188. History of Chemistry.—An historial and biographical survey of chemistry and chemists through a study of the development of new ideas and the establishment of new theories and laws. Credit, 3.
Three class hours. MR. ROBINSON.

191. Chemical Literature.—Intended to give facility in the location of information of a chemical nature. Credit, 1.
One class hour. MR. OBERLANDER.
Prerequisites, Chemistry 152, 166 and a reading knowledge of German or permission of instructor.

193, 194. General Biochemistry.—A broad introduction to the general field of biochemistry for students majoring in chemistry or in the biological sciences, and a background for more advanced or specialized study in this field.
Three class hours; one 3-hour laboratory period. Credit, 4 each semester.
Prerequisites, Chemistry 151 and 152 or equivalent. MR. LITTLE.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Chemistry)

151, 152. Organic Chemistry.—A survey of the properties, preparation and reactions of the important classes of aliphatic and aromatic compounds. The two 3-hour laboratory periods are reserved for and required of chemistry majors.
Three class hours, one or two 3-hour laboratory periods.
Credit, 4-5 each semester.
THE STAFF.

165, 166. Physical Chemistry.—A study of the fundamental theories and laws of physical chemistry. Credit, 3 each semester.
Three class hours. Physical Chemistry Staff.
Prerequisites, Chemistry 30, Mathematics 30 and Physics 26.

167, 168. Physical Chemistry Laboratory.—Experience in modern physicochemicial techniques.
One 3-hour laboratory period. Credit, 1 each semester
Prerequisites, Chemistry 30, Mathematics 30, and Physics 26 or permission of instructor. Concurrent enrollment in Chemistry 165, 166.
Mr. Stengle and Physical Chemistry Staff.

179. Elementary Biochemistry.—The more important facts relating to biological materials and processes. Designed primarily for students not eligible for courses 193 or 194. Not open to chemistry majors.
Three class hours, one 3-hour laboratory period. Credit, 4.
Prerequisite, Chemistry 33 or 151. Mr. Robinson.

CIVIL ENGINEERING

Graduate Faculty: M. P. White, Head of Department, W. W. Boyer, C. E. Carver, Jr., T. H. Feng, D. B. Harris, K. N. Hendrickson, G. A. Marston, E. C. Osgood, J. S. Peck.

In addition to the general University requirements for admission to the Graduate School, each candidate in Civil Engineering must satisfy the following departmental requirements: (a) must submit a record of graduate record examination if graduated from an unaccredited institution, or if applying from a foreign country where this examination is offered, (b) must indicate his major field of interest (fluid mechanics, soil mechanics, structures, transportation engineering, sanitary engineering, etc.).

Three options are offered in the department: (1) Mechanics and Structures, (2) Transportation Engineering, (3) Sanitary Engineering.

Students must satisfy one of the following core curricula:

CORE CURRICULUM FOR MECHANICS AND STRUCTURES OPTION

1. Seminar—one hour, no credit, two semesters.
2. Strength of Materials II—C.E. 188.
3. Introduction to Hydrodynamics—C.E. 193.
4. Dynamics of Machinery—M.E. 185.
5. Advanced Engineering Mathematics—Math 175.
6. Thesis.

CORE CURRICULUM FOR TRANSPORTATION ENGINEERING OPTION

1. Seminar—one hour, no credit two semesters.
2. Hydraulic Engineering—C.E. 192.
3. Theoretical Soil Mechanics—C.E. 279.
4. Probability—Math 163.
5. Municipal Administration—Govt. 178.
6. Thesis.

CORE CURRICULUM FOR SANITARY ENGINEERING OPTION

1. Seminar—one hour, no credit, two semesters.
2. Hydraulic Engineering—C.E. 192.
3. General Applied Bacteriology—Public Health 181.
4. Probability—Math 163.
5. Municipal Administration—Govt. 178.
6. Organic Chemistry—Chem. 181.
7. Thesis.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems. Credit, 3-6.
THE STAFF.

252. Structural Dynamics.—The behavior of linear and nonlinear mechanical systems subjected to periodic forces, to non-periodic forces and to shock loads. Credit, 3.
Prerequisites, Civil Engineering 52 and 53. MR. WHITE.

257. Transportation Analysis and Planning.—The analysis or traffic and transportation engineering problems in highways, railroads and airports and the planning related to those facilities. Credit, 3.
Prerequisite, Civil Engineering 194. MR. BOYER.

261. Experimental Stress Analysis.—Experimental procedures for determination of stresses and strains due to static and dynamic loads. Credit, 3.
Prerequisite, Civil Engineering 53. MR. PECK AND MR. HARRIS.

270. Advanced Structural Theory.—Plastic analysis and design of steel frames. Credit, 3.
Prerequisites, Civil Engineering 71 and 172. MR. OSGOOD.

271. Special Structures.—The analysis and design of two-hinged and hingeless arches and of folded plate and shell roofs. Credit, 3.
Prerequisites, Civil Engineering 71, 172, and 73. MR. OSGOOD.

275. Advanced Fluid Mechanics.—Hydraulic similitude, dimensional analysis, methods of obtaining dynamic similarity in hydraulic models in actual practice, analysis of typical hydraulic models. Credit, 3.
Prerequisite, Civil Engineering 75. MR. CARVER AND MR. HIGGINS.

277. Advanced Sanitary Engineering.—Hydraulic and chemical problems encountered in the design and operation of water and sewage works, stream sanitation and the latest trends of practice and research in sanitary engineering. Credit, 3.
Prerequisites, Civil Engineering 77 and 78. MR. FENG.

279. Theoretical Soil Mechanics.—The phenomena in soil masses subjected to such forces as seepage, frost and imposed loads. Credit, 3.
MR. HENDRICKSON.

280. Applied Soil Mechanics.—The solution of case problems applying the principles of soil mechanics to the design of embankments, retaining walls, footings, raft foundations, and pile structures. Credit, 3.
Prerequisite, Civil Engineering 279. MR. HENDRICKSON.

300. Thesis, Master's Degree. Credit, 6.
Required of all candidates.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

172. Theory of Structures II.—The analysis of statically indeterminate structures by several appropriate methods.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisite, Civil Engineering 70. Mr. Osgood.

174. Theory of Structures III.—The analysis and design of complex or special structures in metal, concrete or wood. Credit, 3.
Prerequisites, Civil Engineering 71, 172, 73 concurrently. Mr. Osgood.

182. Soil Testing.—Sampling and testing of soils for engineering purposes.
One class hour, two 3-hour laboratories . Credit, 3.
Prerequisite, Civil Engineering 80 or equivalent. Mr. Hendrickson.

186. Sanitary Engineering III.—The hydraulics and chemistry of water and sewage treatment; layout and design of water and sewage treatment plants. Credit, 3.
Prerequisites, Civil Engineering 77 and 78. Mr. Feng.

185. Water and Waste Water Analysis.—Analysis of water relative to its quality for various domestic and industrial uses and analysis of wastewater relative to its potentiality of pollution.
Two class hours, one 3-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 2, C.E. 78. Mr. Feng.

187. Open Channel Flow.—A study of steady flow in open channels including backwater curves in natural and artificial channels, hydraulic jump, channel bends and transitions, sediment transport, surges and waves, breakwaters and hydraulic structures. Credit, 3.
Prerequisite, Civil Engineering 75. Mr. Higgins.

188. Strength of Materials II.—Determination of stresses and strains in elements of machines and structures. Credit, 3.
Prerequisite, Civil Engineering 53. Mr. White.

191. Surveying III.—Elements of astronomical, geodetic and photogrammetric surveying, coordinate systems and map projections.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisite, Civil Engineering 32. Mr. Boyer.

192. Hydraulic Engineering.—The analysis and design of hydraulic structures such as storage reservoirs, spillways, dams, levees, shore protection and channel works.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisite, Civil Engineering 75. Mr. Higgins and Mr. Marston.

193. Introduction to Hydrodynamics.—A mathematical treatment of the basic theorems of classical hydrodynamics—potential flow, conformal mapping, wave and vortex motion, Navier-Stokes equations and boundary layer theory. Credit, 3.
Prerequisite, Mathematics 32. Mr. Carver.

194. Advanced Transportation Engineering.—Analysis of the engineering aspects of traffic problems such as traffic signal design, street capacities, parking and channelization.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisite, Civil Engineering 55. Mr. Boyer.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Civil Engineering)

179. Principles of Sanitary Engineering.—For students in the Department of Public Health. Covers phases of Civil Engineering 77 and 78 with consideration of the non-engineering background of the student.
Credit, 3.
Mr. Feng.

180. Soil Mechanics.—Properties of soil and its behavior as an engineering material. Principles of classification, permeability, shear strength and compressibility and applications to simple field problems.
Two class hours; one 3-hour laboratory. Credit, 3.
Prerequisite, Geology 50. Mr. Hendrickson.

DAIRY AND ANIMAL SCIENCE

Animal Science

Graduate Faculty: D. J. Hankinson, Head of Department, D. L. Black, W. G. Black, H. Fenner, R. C. Foley, S. N. Gaunt, D. L. MacFadden, F. E. Potter.

Animal Science is a major program of study within the Department of Dairy and Animal Science.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Major credit for Animal Science students assumes prerequisites in the animal science field as covered in undergraduate courses in this Univerity. All hours by arrangement.

200. Special Problems.—A specific problem in some aspect of animal science. Credit, 3-6.
The Staff.

205. Ruminant Nutrition.—An advanced course in ruminant digestion and metabolism. Special topics will be selected and discussed in the light of recent and current research. Credit, 3.
Prerequisites, Animal Science 151 and Chemistry 179 or equivalent.
Mr. MacFadden.

211. Advanced Animal Genetics.—Modern research in animal breeding with emphasis on the statistical approach. This includes the development of selection indexes for various farm mammals, sire indexes, and breeding plans based on systems of mating and selection. Credit, 3.
Prerequisites, Animal Science 166 and Agricultural Economics 177 and 180 or equivalent. Mr. Gaunt.

215. Mammalian Reproduction.—An advanced course emphasizing the comparative approach to problems of reproductive anatomy and endocrinology. Lectures, laboratory and seminar reports with theoretical and practical considerations of current research findings in laboratory and domestic animals, and in primates. Prerequisites, Zoology 172 and 187.
Credit, 3.
Mr. D. L. Black.

216. Fertility and Fecundity.—The role of heredity, nutrition, pathology and environment in the determination of fertility and fecundity in mammalian forms. Current research directed toward control of reproductive function through experimental means is emphasized. Credit, 3. Prerequisites, Animal Science 166 and Zoology 187, or Animal Science 215. Mr. W. G. Black.

226. The Histology of Domestic Animals.—A functional study of the tissues and organs of domestic animals with special emphasis on those features which have particular economic or physiologic significance in the fields of livestock production, meats, nutrition, milk secretion and animal breeding. Credit, 3. Prerequisites, Zoology 150 and Veterinary Science 175 or equivalent. Mr. D. L. Black.

229, 230. Seminar.—Reports on current literature. Credit, 1 each semester. Maximum credit, 4. The Staff.

300. Thesis, Master's Degree. Credit, 5-10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151. Fundamentals of Animal Nutrition.—Principles of nutrition including study of the nature and function of nutrients and requirements for maintenance and production in ruminants and swine. Credit, 3. Mr. MacFadden.

165. Physiology of Reproduction.—Comparative aspects of anatomy, embryology, endocrinology and physiology of the reproductive systems particularly in farm mammals, concepts of fertility and sterility, and their evaluation. Credit, 3. Mr. W. G. Black.

166. Applied Animal Genetics.—The workings of heredity and variation in farm mammals, and the role of selection procedures and breeding systems in genetic improvement of livestock and their evaluation. Prerequisite, Zoology 153. Credit, 3. Mr. Gaunt.

175. Milk Secretion.—Lactation and all its aspects including anatomy of the mammary gland, development of the bovine udder, endocrine control of secretion and applications in herd management. Credit, 2. Mr. Foley.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Animal Science)

154. Meat Processing. Credit, 3. Mr. Buck.

178. Dairy Cattle Production. Credit, 4. Mr. Foley.

Dairy Technology

D. J. Hankinson, Head of Department.

Dairy Technology is a major program of study within the Department of Dairy and Animal Science.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Major credit Dairy Technology students assumes prerequisites in the dairy technology field as covered in undergraduate courses in this University.

200. Problems in Dairy Technology.—Individual study of specific current problems involved in the processing of dairy products. Credit, 3.
The Staff.

202. Advanced Dairy Chemistry.—The physical, colloidal, and chemical properties of dairy products the role of milk fat, salts, proteins, carbohydrates, and enzyme systems, and their relation to dairy research.
Prerequisite, 175 or equivalent. Credit, 3.
Two 1-hour lectures, one 3-hour laboratory period. Mr. Potter.

209, 210. Seminar.—Reports on current literature.
Credit, 1 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 10.
The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

175. Dairy Chemistry.—The physical and chemical principles which aid in explaining the behavior of milk and milk products in the various technological operations. Application of quantitative and qualitative analyses to dairy products. Credit, 3.
One class hour, one 4-hour laboratory period. Mr. Potter.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Dairy Technology)

152. Market Milk. Credit, 4.
Mr. Evans.

177. Dairy By-Products. Credit, 4.
Prerequisite, Dairy 25 or permission of instructor.
Mr. Evans and Mr. Potter.

178. Ice Cream Making. Credit, 4.
Prerequisite, Dairy 25 or permission of instructor. Mr. Potter.

ECONOMICS

Graduate Faculty: P. L. Gamble, Head of Department, J. L. Blackman, Jr., M. C. Howard, B. R. Morris, S. Schoeffler.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Candidates for admission should have been in the upper half of their graduating class, and should have at least one year of elementary study in Economics and an additional year and one-half of study in Economics, related fields, or equivalent experience. Total 15 credits.

200. Special Studies in Economics. Credit, 2-5 each semester.
The Staff.

211, 212. Macro-Economic Theory.—Nature, construction and use of Social accounting systems. A systematic development of static and dynamic theories of aggregative economic behavior and their applications. Credit, 3 each semester.
The Staff.

213. Monetary Policy.—The organization and policies of the major central banks with special reference to the Federal Reserve System in the light of our monetary theory. Given as required. Credit, 3.
Mr. Gamble.

214. Fiscal Policy.—The theory and practices of government finance with special reference to the United States. Credit, 3.
Mr. Gamble.

231, 232. Micro-Economic Theory.—A systematic development of the theory of the consumer, the firm, the industry, and their interactions. Credit, 3 each semester.
The Staff.

234. Monopoly and Public Utility Problems.—The problem of social control of monopolies and industries affected with a public interest. Given as required.
Prerequisite, Economics 170. Credit, 3.
Mr. Howard.

236. Collective Bargaining.—The legal background of collective bargaining, the process, subject matter, and problems involved. Individual case problems. Credit, 3.
Prerequisite, Economics 179. Mr. Blackman.

240. History of Economic Thought.—A general study of economic thought from its ancient beginnings; the contributions of the various schools; recent changes in economic thought. Given as required. Credit, 3.
Mr. Martin.

251. Mathematical Economics and Economic Model-Building.—The various modern applications of mathematics to economic analysis. Both static and dynamic processes will be examined. Given as required. Admission by consent of instructor.
Prerequisites, Economics 173 or the equivalent and one year of college mathematics. Credit, 3.
Mr. Schoeffler.

252. Econometrics.—The application of modern statistical methods to macro and micro economic theory that has been formulated in mathematical terms.
Prerequisites, Economics 25, 26, Mathematics 1 and 2, or 4 or consent of the instructor. Credit, 3.
Mr. Chaudhry.

261, 262. General Economic History.—Evolution of the major sectors of economic activity in the Western World. Credit, 3 each semester.
Mr. Blackman.

271. Taxation.—The assessment and administration of taxes with particular attention to the economic and social effects of individual taxes and tax systems. Credit, 3.
Prerequisites, Economics 25, 178. Mr. Gamble.

281. Economic Planning.—Various kinds of economic plans in effect or proposed. Appraisal of the techniques of economic planning. Credit, 3.
Mr. Morris.

291, 292. Seminar on Economic Policy.—Selection and application of the tools of economic analysis to major problems of public policy.
Credit, 1-3 each semester.
The Staff.

300. Thesis, Master's Degree. Credit 10.

400. Thesis, Ph.D. Degree. Credit 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

Added work required of graduates: (a) extra readings on same or additional assignments, (b) term paper, (c) special problem or project.

153. Money, Banking and Credit.—The development and operation of the monetary and banking systems of the United States; problems of achieving full employment and price stability through monetary controls. Credit, 3.
Prerequisite, Economics 25. Mr. Gamble.

154. Money, Income and Monetary Policy.—The relationship between money, income and monetary policy. An examination of the relationships between individuals, banks, money markets, governments and central banks. Credit, 3.
Prerequisites, Economics 25, and either Economics 53 or Finance 55.
Mr. Gamble.

155. Economics of Consumption and Personal Finance.—Patterns of consumption, standards of living and the sources and expenditure of individual and family incomes. Credit, 3.
Prerequisite, Economics 25. Mr. Morris.

156. Business Fluctuations and Forecasting.—Nature and causes of business fluctuations; methods of forecasting; government policy for stability; utility of available statistical data as guides to private and public policy.
Prerequisites, Economics 25, 53 or Finance 55. Credit, 3.
Mr. Miller.

ECONOMICS

170. The Structure of American Industry.—Business enterprise, market competition, and economic development in American industries. The social effectiveness of industries analyzed through measures of industrial structure and market performance. Credit, 3.
Prerequisite, Economics 25. Mr. Howard.

173. Modern Economic Theory and Analysis.—Micro-economic analysis; types of markets; applications of linear programming, theory of games and other techniques for rational business planning; balancing forces in free-enterprise economy. Credit, 3.
Prerequisite, Economics 25. Mr. Schoeffler.

175. Mathematical Methods in Economics.—The application of various mathematical concepts and techniques in macro-economic and micro-economic analysis. Special emphasis is placed on the design and interpretation of mathematical models of economic phenomena. Credit, 3.
Prerequisites: Economics 25, 26, Mathematics 1, 2, or 4, or consent of the instructor. Mr. Chaudhry.

177. Economics of International Trade.—Policies, principles, and practices of international trade. Credit, 3.
Prerequisite, Economics 25. Mr. Miller.

178. Public Finance.—Principles of public revenues and expenditures; systems and problems of taxation; use of taxes, expenditures, debt policy to provide full employment, economic growth and price stability.
Prerequisite, Economics 25. Credit, 3.
Mr. Gamble.

179. Labor Problems.—Background of the labor movement and problems involved in the management-labor relationship and the efforts of management, unions and government to solve them. Credit, 3.
Prerequisite, Economics 25. Mr. Morris.

180. Labor Law and Legislation.—Economics effects and historical survey of Federal and state laws and an analysis of important court decisions.
Prerequisites, Economics 25, 79. Credit, 3.
Mr. Blackman.

181. European Economic Evolution.—Evolution of agriculture, manufacturing, banking, and other sectors of the European economy.
Credit, 3.
Mr. Blackman.

182. Economic Development.—Economic problems of underdeveloped countries and the policies necessary to induce growth. Individual projects will be required. Credit, 3.
Prerequisites, Economics 25, 26. Mr. Morris.

183. Social Control of Business.—The formal and informal methods and efforts to maintain, supplement and moderate competition, and the substitution of regulation or public enterprises for competition.
Prerequisite, Economics 25. Credit, 3.
Mr. Howard.

184. Comparative Economic Systems.—The structure, operation, and underlying ideology of the major contemporary forms of social-economic organization. Emphasis on the Soviet Union and the United States.
Prerequisite, Economics 25. Credit, 3.
Mr. Schoeffler.

186. Doctrinal Backgrounds of Contemporary Theory.—Foundations of classical theory from physiocracy through Mill; neoclassicism and its chief variants, the Lausanne, Austrian and English schools; dissenters Marx, German historical school, Veblen. Credit, 3.
Prerequisite, Economics 25. Mr. Martin.

188. Financial Aspects of Economics.—The application of modern flow-of-funds analysis to the financial behavior of the various sectors of the economy. Special emphasis is placed on the financial aspects of business units and the business sector.
Prerequisites, Economics 25 and Accounting 25 or consent of instructor.
Credit, 3.
Mr. Martin.

195, 196. Seminar. Credit, 1-3.
The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Graduate courses in Agricultural Economics and Business Administration may be approved for major credit by a student's guidance committee.

EDUCATION

Graduate Faculty: A. W. Purvis, Dean, A. S. Anthony, W. G. Kornegay, C. F. Oliver, R. Wyman.

The following programs leading to the Certificate of Advanced Graduate Study are offered. Each program requires a minimum of sixty credits beyond the Bachelors degree and the specific program of each candidate must be approved by the candidate's Advisory Committee.

(1) Reading Specialist. Prerequisites, teacher certification and two years of approved teaching. Recommended program: Education 120, 149, 153, 177, 201, or 216, 215, 263, 264, 265, 291 and electives; 21-30 hours in such related graduate courses as abnormal psychology, exceptional child, phonetics, audiology, psychological tests, diagnosis and treatment of behavior problems.

(2) School Guidance Specialist. Prerequisites, teacher certification and one year of approved teaching. Recommended program: Education 149, 177, 201, 215, 216, 240, 241, 242, 243, 291, and electives; 21-30 hours in such related graduate courses as psychological and individual testing, exceptional child, abnormal psychology, theories of personality, sociology, and counseling techniques.

(3) School Principals and Supervisors. Prerequisites, teacher certification and three years of approved teaching and/or administrative experience. Recommended program: Education 110, 149, 153, 177, 200 or 201, 209 or 213, 211, 214, 220, 283 or 284, 289, 291 and electives; 21-30 hours in related graduate courses in such fields as government, business administration, economics, sociology and psychology.

(4) Specialists in Audio-visual Education. Prerequisites, teacher certification and two years of approved teaching, including one year's experience in the audio-visual field. Recommended program: Education

120, 121, 122, 123, 160, 166, 188, 200 or 201, 211, 214, 267, 268, 291 and electives; 21-30 hours in related graduate courses in such fields as engineering, psychology, physics, and statistics.

Before being admitted to candidacy for the Master of Education degree,[1] the student must have, in addition to minimum Graduate School requirements:

1. For programs in secondary education eighteen semester credits of such fundamental professional courses as Education 51, 52, 53, 72, 75, 85, 88, etc. Also a major (24 semester credits) and a minor (15 semester credits) in the subject matter fields to be taught.
2. For programs in elementary education twenty-four semester credits of such fundamental professional courses as Education 51, 60, 61, 62, 64, 85, etc., a broad general education including a minor (15 semester credits) in Arts and Sciences.
3. For programs in both fields experience in teaching is required. Students entering without teaching experience must arrange for student teaching (without graduate credit) as soon as possible.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

110. Evaluation in Elementary Schools.—Standardized and teacher made tests, rating scales, report cards, growth charts, readiness measures, and diagnosis of educational deficiency in elementary pupils. (To be taken intead of Education 153 by those training for elementary teaching.)
Credit, 2-3.
Miss McManamy.

120. Construction of Audio-Visual Aids.—Designed to help teachers and audio-visual specialists to prepare audio-visual materials for use in an educational program. Students will prepare slides, graphics, recordings, still pictures, motion pictures. Credit, 2-3.
Prerequisite, Education 166. Mr. Sleeman.

121. Teaching With Television and Radio.—Provides the classroom teacher with an understanding of television and radio so that he can participate in the preparation, utilization, and evaluation of educational programs using these media. Credit, 3.
Prerequisite, Education 166. Mr. Wyman.

122. Photography in Education.—Theory and practice of taking and processing photographs for use in educational activities. Credit, 3.
Prerequisites, Education 120 and 166. The Staff.

123. Audio-Visual Technology.—Applications of acoustics, electricity, magnetism, mechanics and optics to audio-visual equipment and techniques. Credit, 3.
Prerequisite, Education 166. The Staff.

130. Elementary School Science.—Methods and materials of instruction.
Credit, 2-3.
Mr. Hall.

131. Elementary School Social Studies.—Recent findings in research in terms of their implications for the elementary school social studies program. Credit, 2-3.
Mr. Darnell.

[1] For a description of the Master of Arts in Teaching see page 20.

149. Data Processing for Schools.—Theory and practice in the use of simple types of data processing equipment in scheduling, record keeping, attendance, and registers. Credit, 3.
Prerequisites, Education 153 or 291. Mr. Archer.

200. Problem.—A critical study of some problem in the educational field. Two bound copies of the written report must be provided for the School of Education by the student. Credit, 1-4.
Prerequisite, Education 291 or its equivalent. The Staff.

201. Practicum or Internship.—Practice in the application of educational theory and technique in the public schools in such fields as supervision, administration, audio-visual organization, and guidance. The student will prepare a comprehensive written report of his practice, experience and problems. A student cannot offer both Education 200 and 201 for the Master's degree. Credit, 4-8.
Prerequisites, Education 291 and teaching experience. The Staff.

209. Administering Secondary Schools.—Housing, finance, schedule, the library, guidance, cafeteria, public relations, etc. Credit, 3.
Prerequisite, teaching experience. Mr. Oliver.

210. Administering Extra-Curricular Activities.—Scheduling, financing, sponsorship, regulation of pupil participation. Credit, 2-3.
Prerequisite, teaching experience. Mr. Oliver.

211. Community Relations for School Personnel.—The development of good public relations policies and the techniques of assisting lay people in interpreting school activities, policies, and objectives. Credit, 3.
Mr. Oliver.

213. Administering Elementary Schools.—The principal's responsibilities, organization of the school office, scheduling, use of school facilities, curriculum organization, staff relationships, and the place of the school in the community. Credit, 3.
Prerequisite, teaching experience. Mr. Bertrand.

214. Principles of Supervision.—Principles and problems of supervision and the exercise of educational leadership in the improvement of instruction in the elementary curriculum and the secondary school content fields. Credit, 3.
Mr. Bertrand.

215. Workshop in Education*.—Group study of practical problems in curriculum, instruction, and administration for school personnel in service. Credit, 2-6.
The Staff.

216. Seminar in Education*.—An intensive analytical study of some phases of education. Credit, 2-6.
The Staff.

220. School Laws of Massachusetts.—A review of the legal relations of school personnel covering experiences in school and community, presented in a series of selected cases. Credit, 3.
Mr. Purvis.

* No more than six credits altogether can be taken in Education 215 and 216.

230. Comparative Education.—Studies of contemporary educational systems in such countries as England, France, Germany, Russia, and Japan. Credit, 2-3.
Prerequisite, Education 151. Mr. Wellman.

231. Contemporary Problems in Education.—An intensive examination of several major issues confronting American education. Evaluation, and criticism of proposals being offered for their solution. Credit, 3.
Mr. Eddy.

232. History of American Education.—The development of American education in the context of American intellectual thought. Credit, 3.
Mr. Cohen.

240. Occupations and Placement in School Guidance.—The collection, evaluation and use of occupational, educational, and placement information with individuals and groups of students in school guidance. Credit, 3.
Prerequisites, Education 177, teaching experience and permission of the instructor. Mr. Pippert.

241. Administration of School Guidance Services.—Operative framework of guidance programs in terms of personnel, functions, physical facilities, institutional integration, finance and laws. Credit, 3.
Prerequisites, Education 177, teaching experience and permission of the instructor. Mr. Pippert.

242. Elementary School Guidance.—A study of skills, techniques, and objectives of guidance in the elementary school, emphasizing those aspects of guidance of particular interest to the elementary school teacher or guidance person. Credit, 3.
Prerequisites, Education 177, Psychology 188, and background in Psychology. Mr. Pippert.

243. Group Activites in Guidance.—A guidance study of school groups. Attention will be given to group dynamics, discussion techniques, group counseling, sociometric methods, and other school group activities.
Prerequisite, Education 177, Psychology 188, and background in Psychology. Credit, 3.
Mr. Pippert.

257. Children's Literature.—The basic types and foremost works in the literature for children. Attention to different interest and vocabulary levels and to the criteria for selection of lists for individual children. Credit, 2-3.
Prerequisite, Education 161. The Staff.

258. Implementing the Elementary School Program.—Curriculum design and classroom organization, including practices in planning, presenting, and evaluating programs involving integration of skills and activities for the various grade levels. Credit, 2-3.
Prerequisite, Education 160 and teaching experience. Miss O'Leary.

263. Diagnosis of Reading Difficulties.—Theory and interpretation of diagnostic procedures to develop a background of information in the diagnosis and treatment of reading difficulties. Credit, 3.
Prerequisite, Education 161. Mr. Byrne.

264. Individual Case Studies of Reading Problems.—Practical experience in the gathering and summation of information to form a case study of a

child in order to determine the seriousness of the reading problem and the underlying causes and to make recommendations for their correction or remediation. Credit, 3.
Prerequisite. Education 263. Mr. Byrne.

265. Techniques in Remedial Reading.—Methods and materials in diagnosis and remedial instruction. Credit, 3.
Prerequisite, Education 161. Miss O'Leary.

267. Auto-Instructional Devices and Programed Learning.—Theory and practice of programed learning for typical school subjects. Each student will set up objectives and construct a program for a unit of work. Implications for future use in education will be considered. Credit, 3.
Prerequisite, Education 166. Mr. Wyman.

268. Administration of Audio-Visual Services.—To prepare audio-visual coordinators, directors and supervisors in the operation of an audio-visual service. Teacher training, selection of materials and equipment, storage, cataloging, distribution, maintenance, and financial support.
Prerequisites, Education 166 and teaching experience. Credit, 3.
Mr. Wyman.

283. Comprehensive High School.—Critical study of the historical development, objectives, course offerings, and crucial issues confronting the all-purpose high school. Critical analysis of various suggestions for improvement. Credit, 3.
Mr. Anthony.

284. The Junior High School.—The history of the Junior High School movement; the philosophy, aims and functions of a Junior High School, the instructional program, the role of the basic skills, guidance, organization, extra-curricular activities, and current trends. Credit, 2-3.
Mr. Kornegay.

289. Cooperative Curriculum Planning.—Approved methods of curriculum planning, group work, consensus studies, used by cities and towns in curriculum development. Credit, 2-3.
Prerequisite, Education 188 or 160. Mr. Kornegay.

291. Educational Research.—The principles and methods of research with special emphasis upon the technique used in Education. Statistics are studied chiefly from the standpoint of reporting and understanding the results of research. Credit, 3.
Mr. Archer.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151. History of Education. Credit, 3.
Mr. Eddy, Mr. Cohen and Mr. Wellman.

152. Principles and Methods of Teaching. Credit, 3.
Mr. Anthony and Mr. Thelen.

153. Educational Tests and Measurements. Credit, 3.
Mr. Archer.

160. Elementary School Curriculum. Credit, 3.
Mr. Darnell.

161. Elementary Reading and Language Arts. Credit, 3.
Miss O'Leary and Mr. Byrne.

162. Elementary Arithmetic. Credit, 2-3.
Mr. Hall.

164. Principles of Elementary Education. Credit, 3.
Miss McManamy.

166. Preparation and Use of Audio-Visual Aids. Credit, 3.
Mr. Wyman and Mr. Sleeman.

172. Vocational Education in Agriculture. Credit, 3.
Mr. Jones.

173. Apprentice Teaching in Agriculture. Credit, 6.
Mr. Jones.

175. Technique of Teaching Vocational Agriculture. Credit, 3.
Mr. Jones.

177. Principles of School Guidance. Credit, 3.
Mr. Pippert.

188. Secondary School Curriculum. Credit, 2-3.
Mr. Kornegay and Mr. Barfield.

COURSE FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Education)

185. Observation and Practice Teaching. Credit, 6.
The Staff.

ELECTRICAL ENGINEERING

Graduate Faculty: G. Dale Sheckels, Head of Department, G. W. Bett, H. A. Herchenreder, J. W. Langford, J. W. Mohn, C. S. Roys, D. E. Scott.

Requirements for the Master of Science Degree in Electrical Engineering, in addition to those listed on page 19, are as follows:

1. Four required courses totaling 12 credits.
2. Four courses totaling a minimum of 12 credits selected from one of the three areas of interest: power systems, feedback control systems, or information processing. One minor elective course may be substituted for one of the four major courses. A maximum of eight credits of 100 series courses, and three credits of EE 200, may be included in the selection.
3. A minimum of six credits of research with an acceptable thesis.
4. No foreign language is required.
5. Supporting courses will be required for those students lacking the prerequisites specified on the following pages.

First Semester		*Second Semester*	
EE 205. Analysis of Linear Systems.	(3)	EE 206. Electromagnetic Field Theory.	(3)
Physics 201. Theoretical Physics.	(3)	EE 300. Research.	(6)
Math. 175. Advanced Engrg. Math.	(3)		
EE 300. Research (Proposal)	(0)		

Two courses each semester from one of the following three groups:

Power Systems Group

EE 177.	Principles of Switching Circuits I.	(4)
EE 186.	Power System.	
EE 211.	Power Transmission & Relaying.	(3)
EE 213.	Lightning Protection & Grounding.	(3)
EE 200.	Special Problems.	(3)
EE 178.	Principles of Switching Circuits II.	(4)
EE 181.	Advanced Electrical Machinery.	(4)
EE 190.	Feedback Control Systems.	(4)
EE 212.	Symmetrical Components & System Stability.	(3)
EE 200.	Special Problems.	(3)

Feedback Control System Group

EE 231.	Linear Feedback Systems.	(3)
EE 245.	Random Signals and Noise.	(3)
EE 247.	Transistor Circuits.	(3)
EE 200.	Special Problems.	(3)
EE 181.	Advanced Electrical Machinery.	(4)
EE 188.	Pulse Circuits.	(4)
EE 232.	Non-linear Feedback Systems.	(3)
EE 200.	Special Problems.	(3)

Information Processing Group

EE 245.	Random Signals and Noise.	(3)
EE 247.	Transistor Circuits.	(3)
EE 200.	Special Problems.	(3)
EE 190.	Feedback Control Systems.	(4)
EE 194.	Microwave Engineering.	(4)
EE 188.	Pulse Circuits.	(4)
EE 248.	Network Analysis and Synthesis.	(3)
EE 200.	Special Problems.	(3)

Minor Elective Group

Math. 171.	Vector Analysis.	(3)
Math. 181.	Complex Variables.	(3)
Math. 183.	Computational Methods.	(3)
Math. 193.	Fourier Series and Orthogonal Systems	(3)
Physics 167.	Statistical Mechanics & Information Theory	(3)
Physics 211.	Elements of Quantum Theory	(3)
Math. 176.	Advanced Engrg. Math.	(3)
Math. 194.	Theoretical Advanced Calculus.	(3)
Physics 188.	Solid State Physics.	(3)

In exceptional cases, the above programs may be modified at the suggestion or with the approval of the major adviser. Additional courses in each of the three areas of interest may be offered upon sufficient demand.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—A study of recent advances and current problems in a specialized field of electrical engineering. Limited to three credits for degree candidates. Credit, 3.
Prerequisite, Consent of instructor. THE STAFF.

205. Analysis of Linear Systems.—Transient behavior of recurrent and distributed electrical, mechanical, acoustical, and heat-flow systems. Modern principles and methods of analysis basic to system synthesis. Credit, 3.
Prerequisite, Electrical Engineering 52 or equivalent.
MR. FITZGERALD AND MR. ROYS.

206. Electromagnetic Field Theory.—Development from Maxwell's equations leading to the wave equation, propagation in various media, waveguides, resonant cavities and antennae. Credit, 3.
Prerequisite, Electrical Engineering 57 or equivalent.
MR. SHECKLES AND MR. MOHN.

211. Power Transmission and Relaying.—Electrical characteristics and equivalent circuits for transmission lines and cables. Protective relaying for transmission and distribution systems. Credit, 3.
Prerequisite, Electrical Engineering 54 or equivalent.
MR. LONGLEY AND MR. EDWARDS.

212. Symmetrical Components and System Stability.—The use of symmetrical components for the study of steady state and transient stability of transmission systems. Determination of stability by the step-by-step solution of the non-linear differential equations. Credit, 3.
Prerequisite, Electrical Engineering 186 or equivalent.
MR. EDWARDS AND MR. LONGLEY.

213. Lightning Protection and Grounding.—Electrical characteristics of lightning discharges, switching surges, lightning arresters, and insulating materials, and traveling waves on transmission systems. Methods of grounding and protection for overhead lines, cables, substation equipment and generating stations. Credit, 3.
Prerequisite, Electrical Engineering 54 or equivalent.
MR. EDWARDS AND MR. LONGLEY.

231. Linear Feedback Systems.—Analysis of linear feedback systems by Root-Locus, Nyquist and Nichols plots. Performance and stability of feedback systems in time and frequency domain by analytical and graphical methods. Credit, 3.
Prerequisite, Electrical Engineering 190 or equivalent.
MR. BETT, MR. HERCHENREDER AND MR. SCOTT.

232. Non-Linear Feedback Systems.—Analysis and synthesis of non-linear systems and systems with small non-linearities by Z-plane transforms, first harmonic approximations, phase-plane and Tsypkia loci for on-off controllers. Credit, 3.
Prerequisite, Electrical Engineering 231 or equivalent.
MR. BETT, MR. HERCHENREDER AND MR. SCOTT.

245. Random Signals and Noise.—Fundamental concepts of discrete and continuous probability theory. Averages, sampling, correlation coefficients and functions. Description of randomly varying signals in terms of their

statistical properties. Statistical analysis of linear systems. Optimum filter synthesis. Credit, 3.
Prerequisite, Electrical Engineering 52 or equivalent.
Mr. Herchenreder and Mr. Scott.

247. Transistor Circuits.—Physical principles, characteristics, equivalent circuits and stability limitations. Performance criteria determined with respect to temperature, time, frequency, circuit configuration, signal amplitude and wave-form. Credit, 3.
Prerequisite, Electrical Engineering 56 or equivalent.
Mr. Langford and Mr. Mohn.

248. Network Analysis and Synthesis.—Modern circuit theory with emphasis on synthesis. Brune, Darlington and other realization techniques. The approximation problem in time and frequency domains. Credit, 3.
Prerequisite, Electrical Engineering 205. Mr. Langford and Mr. Scott.

300. Research.—An individual theoretical and/or experimental investigation or a design problem terminating with an acceptable thesis. The research proposal is to be approved at least one semester before graduation. The research credit may be spread over several semesters. Credit, 6.
Mr. Bett, Mr. Langford, Mr. Roys, Mr. Sheckles, Mr. Herchenreder, Mr. Mohn and Mr. Scott.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

177. Principles of Switching Circuits.—Logical design of switching circuits with emphasis on the scientific methods available; the analysis and synthesis of switching systems using electromagnetic, electronic and solid state devices.
Three class hours, one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 56. Mr. Edwards.

181. Advanced Electrical Machinery.—Modern methods of analysis, including two reaction, symmetrical component, matrix, vector-dyadic and tensor formulations. Applications include d-c and a-c motors, generators and amplidynes.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 52, 54, concurrently.
Mr. Edwards and Mr. Roys.

186. Power System Networks.—Power transfer diagrams, voltage studies, system stability criteria, short-circuit calculations and protective methods.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 52. Mr. Edwards and Mr. Sheckels.

188. Pulse Circuits.—Generation, transmission and processing of information by means of pulses, with applications to computers, communication, radar and television.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 56. Mr. Langford.

190. Feedback Control Systems I.—Analysis and design of error-sensitive control systems. Analytical and graphical determination of steady

state and transient performance; applications to electrical, mechanical, and hydraulic systems.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 52. Mr. Bett.

194. Microwave Engineering.—The fundamental principles of communications and electromagnetism and their application to the special problems of the generation, transmission, propagation and reception of microwaves.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 57. Mr. Roys and Mr. Mohn.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Electrical Engineering)

179. (I) Communication Circuits.—Theory of lumped and distributed passive circuits by classical and s-plane methods, with applications to communications and control.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 52. Mr. Langford and Mr. Scott.

180. (II) Electronics III.—Active circuits and communication theory covering tube and semiconductor circuitry with emphasis on aspects pertaining to information transmission.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 56. Mr. Langford and Mr. Mohn.

184. (II) Industrial Electronics and Control.—Industrial electronic devices and their characteristics; basic circuits and theory, application to commercial equipment.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 55 or 62. Mr. Roys.

185. Electrical Measurements.—Theory and practice of electric and magnetic measurements, accuracy, precision, maximum possible and probable errors, and limitations of measurements and devices.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, Electrical Engineering 42. Mr. Laestadius.

ENGLISH

Graduate Faculty: H. O. Brogan, Head of Department, J. Chametzky, D. R. Clark, T. W. Copeland, A. R. Duckert, M. Golden, R. Haven, V. P. Helming, S. Kaplan, J. Langland, H. T. McCarthy, W. G. O'Donnell, A. Page, A. J. Silver, J. C. Weston, Jr.

All graduate students should, as soon as they begin their graduate studies, secure from the Department of English detailed information on requirements. Language requirements: the ability to translate, with the aid of a dictionary, two of the following languages: 1. French, 2. German, 3. Latin, 4. Italian or Spanish.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—For students wishing to do special work not covered by courses listed in the curriculum. Permission must be secured from the head of the department and the instructor under whom the study will be done. The latter will supervise and evaluate the work.
Credit, 2-6.
THE DEPARTMENT.

201. Old English.—Old English grammar with prose translation. This (or 203) is required of all English majors. Credit, 3.
MR. HELMING AND MISS DUCKERT.

203. Middle English.—The language of Chaucer and the mediaeval romances. This (or 201) is required of all English majors. Credit, 3.
MISS DUCKERT AND MR. HELMING.

251. Shakespeare.—A close study of two comedies, two histories, and two tragedies. Credit, 3.
Prerequisite, English 167 or the equivalent.
MR. O'DONNELL AND MR. LANE.

254. Carlyle.—The life and writings of Thomas Carlyle. Biographic, textual, ideational, and esthetic problems will be explored so as to develop competence in research and criticism. Credit, 3.
Prerequisite, English 181 or the equivalent.

260. Studies in Eighteenth-Century Literature.—This course offers a concentrated study of a limited selection of significant works and an investigation of particular textual, biographical, and critical problems.
Prerequisite, English 177 or 178, or the equivalent. Credit, 3.
MR. COPELAND, MR. GOLDEN, AND MR. WESTON.

261. Melville.—The life, thought, and art of the most complex and representative figure of the American Renaissance. Although emphasis will be placed upon the pre-Civil War novels, the later poetry will also be examined. Credit, 3.
Prerequisite, English 157 or 158, or the equivalent. MR. KAPLAN.

264. Joyce, Yeats, and Eliot.—The experiments in expressing personal experience that established the Twentieth Century literary myths.
Credit, 3.
MR. VARLEY AND MR. CLARK.

300. Thesis, Master's Degree. Credit, 9.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

In any of these courses English majors are required to supplement the undergraduate assignments with a substantial special study.

153. Creative Writing.—Intensive practice in writing prose fiction, with some attention to other forms, supplemented by discussion of ideas and techniques in contemporary literature. Admission by consent of the instructor. Credit, 3.
Three class hours. MR. MCCARTHY AND MISS HORRIGAN.

154. Creative Writing (154 D Drama, 154 F Prose Fiction, 154 V Verse).—Continuations of English 153 which allow emphasis, according to the section, upon drama, prose fiction (the short story and the novel), or verse. Prerequisite: Grade of A or B in English 153 or the equivalent, or the consent of the instructor. Credit, 3.
Three class hours. Mr. Langland, Mr. Madeira, and Mr. Tucker.

155. Early American Literature.—Significant American writings during the Colonial, Revolutionary, and early Federalist periods. Credit, 3.
Three class hours. Mr. Kaplan.

156. American Poetry.—American poetry from 1800 to the emergence of a modern style early in the twentieth century. Credit, 3.
Three class hours.
Mr. Kaplan, Mr. Williams, Mr. Ratner, and Mr. Gozzi.

157. Major American Writers.—Selected major American writers of the nineteenth and twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, James, Adams, Fitzgerald, and Hemingway.
Three class hours. Credit, 3.
Mr. O'Donnell, Mr. Kaplan, Mr. Williams, Mr. McCarthy, Mr. Rudin, and Mr. Gozzi.

158. Major American Writers.—Selected major American writers of the nineteenth and twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Twain, Crane, Dreiser, Wolfe, and Faulkner.
Three class hours. Credit, 3.
Mr. Kaplan, Mr. Williams, Mr. Ratner, and Mr. Gozzi.

163. Literary Criticism.—An introduction to the history of literary criticism. Chief emphasis given to the major philosophical critics, from Plato and Aristotle to the nineteenth century. Credit, 3.
Three class hours. Mr. Copeland and Mr. Clark.

164. Literary Criticism.—An examination and application of techniques of criticism, with special consideration of the twentieth century.
Three class hours. Credit, 3.
Mr. Clark.

166. Chaucer.—The major works, especially *Troilus* and selected *Canterbury Tales,* as combinations of medieval art and thought with pre-Renaissance motifs and Chaucer's genius for realism. Credit, 3.
Three class hours. Mr. Helming and Miss Duckert.

167. Shakespeare.—The dramatic art of Shakespeare as revealed in a study of approximately twenty plays. Credit, 3.
Three class hours.
Mr. O'Donnell, Mr. Lane, Mr. Labranche, and Mr. C. Smith.

168. Shakespeare.—An intensive study of six plays, directed toward a scholarly appreciation of Shakespeare as a dramatic artist.
Prerequisite: English 67, 167, or the equivalent. Credit, 3.
Three class hours. Mr. O'Donnell and Mr. Labranche.

169. The Renaissance in England.—The non-dramatic literature of Tudor and Jacobean England in terms of emergent forms and literary ideas. Special attention to More, Spenser, Bacon, and Thomas Browne.
Three class hours. Credit, 3.
Mr. Collins, Mr. Labranche, and Mr. Wolf.

170. Elizabethan and Jacobean Dramatists.—Non-Shakespearean dramatists of the English Renaissance. A study of the major plays of Marlowe, Jonson, Beaumont, Fletcher, Tourneur, Webster, and Ford. Credit, 3. Three class hours. MR. CHAMETZKY, MR. C. SMITH, AND MR. WOLF.

172. Greek Classics (in translation).—Homer, lyric poetry, the major dramatists, selected dialogues of Plato, Thucydides, and their relations to the classical tradition in English literature. Credit, 3. Three class hours. MR. PAGE , MRS. HOGAN, AND MR. WOLF.

173. Seventeenth-Century Poetry, 1600-1660.—A study of such representative poets as Donne, Jonson, Herrick, Lovelace, Suckling, Herbert, Vaughan, Crashaw, Traherne, and Marvell, with emphasis upon the Metaphysical Tradition. Credit, 3. Three class hours.
MR. KOEHLER, MR. COLLINS, MR. TUCKER, AND MR. LABRANCHE.

174. Milton.—Development of the mind and art of Milton as a figure of the English Reformation and the late Renaissance, with emphasis on *Paradise Lost.* Credit, 3. Three class hours. MR. KOEHLER, MR. COLLINS, AND MR. LABRANCHE.

175. English Literature of the Restoration.—Intellectual, moral, and literary values of the Restoration period from 1660 to 1700. Emphasis on Dryden's satire, the Restoration theater, and Congreve's comedy of manners. Credit, 3. Three class hours. MR. BARRON, MRS. HOGAN, AND MR. WESTON.

177. English Literature of the Eighteenth Century.—The literature of the Augustan Age, with special emphasis on the writings of Swift and Pope. Credit, 3. Three class hours. MR. GOLDEN, MR. BARRON, AND MR. WESTON.

178. English Literature of the Eighteenth Century.—The literature of the later eighteenth century with special emphasis on the Johnson Circle. Three class hours. Credit, 3.
MR. COPELAND, MR. GOLDEN, AND MR. WESTON.

179. The Romantic Poets.—A study of the Romantic Movement as revealed in the poetry and prose of Wordsworth, Coleridge, and the other early Romantics. Credit, 3.
MR. BROGAN, MR. HAVEN, AND MR. SILVER.

180. The Romantic Poets.—A further study of the Romantic Movement, with particular attention to Byron, Shelley, and Keats. Credit, 3. Three class hours. MR. BROGAN, MR. PAGE, AND MISS HORRIGAN.

181. English Prose of the Nineteenth Century.—A study of the techniques and ideas of the chief prose writers, including Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincey, Carlyle, and Ruskin. Credit, 3. Three class hours. MR. BROGAN AND MR. HAVEN.

182. English Prose of the Nineteenth Century.—The chief Victorian prose writers, including Macauley, Newman, Arnold, Mill, Huxley, Pater, and Stevenson. A continuation of English 181, but may be elected independently. Credit, 3. Three class hours. MR. HAVEN, MR. SILVER, AND MR. HICKS.

ENGLISH

183. The Development of the English Novel.—The reading and discussion of eight or nine great English novels from Defoe through the Victorians. Credit, 3.
Three class hours. Mr. Brogan, Mr. Helming, Mr. Page, Mr. Golden, Mr. McCarthy, and Mr. Ratner.

184. Victorian Poetry.—An exploration of the range and diversity of Victorian poetry, with special attention to Tennyson, Browning, Arnold, and the Pre-Raphaelite Movement. Credit, 3.
Three class hours. Mr. Silver and Mr. Hicks.

185. Modern European Drama (in translation).—Major modern dramatists beginning with Ibsen and including Chekhov, Pirandello, Strindberg, Giraudoux, Shaw, and others. Emphasis on comparative currents in various European nations. Credit, 3.
Three class hours.
Mr. Williams, Mr. Clark, Mr. Rudin, Mrs. Hogan, and Mr. Madeira.

187. Modern Novel: 1890-1920.—The expanding form of the novel and increasing interest in social causes as exhibited in some twelve novels.
Three class hours. Credit, 3.
Mr. Varley, Mr. Golden, Mr. Chametzky, Mr. Haven, Mr. McCarthy, and Mr. Hicks.

188. Modern Novel: 1920-1950.—An analytical presentation of some twelve novels. A continuation of English 187 but may be elected independently; no English major may, however, elect both English 187 and 188. Credit, 3.
Three class hours.
Mr. O'Donnell, Mr. Varley, Mr. Chametzky, and Mr. Hicks.

189. Modern Poetry.—An analysis of twentieth-century poetry developing from such authors as Hardy, Hopkins, Whitman, and Emily Dickinson to those of the present. Credit, 3.
Three class hours.
Mr. Koehler, Mr. Clark, Mr. Langland, Mr. Barron, Miss Horrigan, and Mr. Tucker.

190. Modern British and American Drama.—A study of representative dramatists since the late nineteenth century, including Shaw, Fry, O'Casey, O'Neill, Williams, and others. Emphasis on changing trends in twentieth-century dramatic art. Credit, 3.
Three class hours.
Mr. Williams, Mr. Rudin, Mrs. Hogan, and Mr. Madeira.

195. Seminar in English Literature or Comparative Literature in Translation.—For English majors, but open to others who are specially qualified. Admission by consent of the instructor, who will be named when the topic for a given semester is announced. Credit, 3.
Three class hours. The Staff.

196. Seminar in American Literature.—For majors, but open to others who are specially qualified. Admission by consent of the instructor, who will be named when the topic for a given semester is announced.
Three class hours. Credit, 3.
The Staff.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in English)

160. History of the English Language.—The development of English, including a study of vocabulary and usage levels, grammars, and dictionaries. Special attention is given to matters crucial to the teaching of English in secondary schools. Credit, 3.
Three class hours. Miss Duckert and Mr. Wolf.

161. History of English Language.—A study of the major phases of English literary history. Representative writers from Chaucer to Dryden will be examined. Credit, 3.
Three class hours.
Mr. Helming, Mr. Varley, Mr. Golden, and Mr. C. Smith.

162. History of English Literature.—A study of representative English writers from the eighteenth century to the present. A continuation of English 161 but may be elected independently. Credit, 3.
Three class hours. Mr. Varley.

COMPARATIVE LITERATURE

191. Anglo-German Literary Relationships Since 1750.—An interdepartmental course conducted by professors of English and German. Subjects and problems common to English and German literature since the middle of the eighteenth century, with attention to German-American literary relationships.
Three class hours. Credit, 3.

LINGUISTICS

193. Linguisitics.—A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature.
Three class hours. Credit, 3.
Miss Duckert.

ENTOMOLOGY AND PLANT PATHOLOGY

Graduate Faculty: J. H. Lilly, Head of Department, W. M. Banfield, W. B. Becker, C. J. Gilgut, J. F. Hanson, F. W. Holmes, J. J. McRitchie, W. N. Rice, R. A. Rohde, F. R. Shaw, M. E. Smith, H. L. Sweetman, W. E. Tomlinson, Jr., W. D. Tunis, E. H. Wheeler, W. D. Whitcomb, B. M. Zuckerman.

Entomology

Requirements for the M.S. degree in Entomology include completion of a thesis and demonstration of a reading knowledge of one foreign language. Also each candidate must take or have had Entomology 35, 155, 156 and 157, or their equivalents, plus a minimum of eleven additional graduate credits in Entomology, including the six credits in "200" courses that are required by the Graduate School.

Requirements for the Ph.D. degree include those established by the Graduate School, plus any additional ones specified by the student's Guidance Committee.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

(Most 200 series courses in the department are given on a rotating basis, subject to change on student demand.)

200. Special Problems.—Selected research problems in entomology. Credit, 1-5.
THE STAFF.

201. Advanced Insect Morphology and Phylogeny.—Laboratory, lecture, and reading assignments in morphology and phylogeny of all orders of insects, living and fossil. Credit, 3.
Prerequisites, Entomology 26, 155, 156, 157 or equivalent.
MR. HANSON.

203. Insect Embryology.—The embryological development of a generalized type of insect, after which specific insects are considered. Lectures, assigned readings, laboratory work. Credit, 2.
Prerequisite, Entomology 157. MR. SHAW.

207. Advanced Insect Physiology.—Discussion and laboratory work dealing with the functions of the organ systems of insects, with emphasis on methods of analysis and study of physiological processes in insects.
Prerequisite, Entomology 181 or equivalent. Credit, 3.
MR. SWEETMAN.

211. Insect Behavior.—The honey bee as a type for the study of behavior; interpretations of the reasons for the actions of this insect. Other species may be included for completeness. Credit, 3.
Prerequisites, Entomology 26, 166 or equivalent. MR. SHAW.

214. Advanced Animal Ecology.—Basic principles of terrestrial, limnological, and marine ecology, with special emphasis on the influence of causal factors, both physical and biotic, that regulate the activities of all organisms. Credit, 3.
Prerequisite, Entomology 179 or equivalent. MR. SWEETMAN.

221. Insect Toxicology.—The chemistry of insecticides and their physiological effects on insects, man and other animals. Credit, 3.
Prerequisite, permission of instructor. MR. WAVE.

223. Advanced Biological Control.—The basic fundamental principles, as well as practical application of biological control of insects. A section is devoted to control of pest weeds with insects. Credit, 3.
Prerequisite, Entomology 80 or equivalent. MR. SWEETMAN.

242. Advanced Anthropod Taxonomy.—Classification of selected insects and insect allies, including latest methods in Taxonomy and principles of classification. Credit, 1-9.
THE STAFF.

A. Culicidae	MISS SMITH
B. Immature stages of insects	MISS SMITH
C. Ticks	MR. SHAW
D. Siphonaptera	MR. SHAW
E. Simuliidae	MR. SHAW
F. Tabanidae	MR. SHAW
G. Minor orders of insects	MR. HANSON
H. Anthropods other than insects	MR. HANSON
I. Other groups of insects	THE STAFF

245. Historical Entomology.—Lives and works of outstanding entomologists of the world; history of entomology. Credit, 2.
Prerequisite, permission of instructor. MR. LILLY.

248. Principles of Systematic Entomology.—The International Code of Zoological Nomenclature, and the Opinions thereon; type categories; the species concept. Credit, 3.
Prerequisites, Entomology 26, 155, 156. MR. HANSON.

250. Advanced Medical Entomology.—Detailed studies of insects as parasites of man and animals. Biology, vector-relationship, taxonomy and control. Credit, 2-5.
Prerequisite, Entomology 174 or equivalent. MR. SHAW.

270. Advanced Research Methods.—The principles, methods of analysis and presentation of results of research. Credit, 3.
Prerequisite, Entomology 181 or equivalent. MR. SWEETMAN.

280. Seminar.—Reports on the current literature of entomology; special reports by resident and visiting speakers. Credit, 1 each semester.
One class hour. (Maximum for M.S. Candidates, 2)
(Maximum for Ph.D. Candidates, 4)
THE STAFF.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADATE STUDENTS
(For either major or minor credit)

155, 156. Classification of Insects.—The identification of insects, including immature stages. First semester: Orthoptera, Hemiptera, Coleoptera; second semester: other orders. Either semester may be elected independently.
Three 2-hour laboratory periods. Credit, 3.
Prerequisities, Entomology 26; Entomology 57 recommended. MISS SMITH.

157. Insect Morphology.—The external and internal anatomy of the major orders, with stress on phylogenetic relationships, as background for subsequent work in taxonomy and physiology of insects.
One class hour; three 2-hour laboratory periods. Credit, 4.
Prerequisite, Entomology 26. MR. HANSON.

160. Structural Pest Control.—Methods of combating insect and rodent pests, with emphasis on the control of those pests attacking buildings and other structures, foods, fabrics, and other stored products in homes or other establishments. Credit, 3.
Two class hours; one 2-hour laboratory period.
Prerequisite, Zoology; Entomology 26 desirable. MR. SWEETMAN.

172. Forest and Shade Tree Insects.—The principles and methods of controlling insects which attack shade trees, forests and forest products. A study of the more important species, their identification, biology, and specific control measures.
One class hour; two 2-hour laboratory periods. Credit, 3.
Prerequisite, Entomology 26; 155, 156 and 157 desirable. MR. HANSON.

174. Medical and Veterinary Entomology.—Relationships of insects and their allies to the health of man and animals. The classification, biology and control of these pests.
One class hour; two 2-hour laboratory periods. Credit, 3.
Prerequisite, Entomology 26. Mr. Shaw.

179. Animal Ecology.—The relation of animals to their environment, covering such physical factors as temperature, moisture, light, etc., and biotic factors as neighbors, competitors, predators, etc. Actual measurements of environmental factors and responses of animals in the field and laboratory.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Entomology 26 or Zoology 1. Mr. Sweetman.

180. Insect Control.—The scientific basis of insect control, considered from the chemical, biological, ecological, mechanical, and legislative approaches. Special emphasis on the composition, manufacture, preparation, and reaction of insecticides, and the use of resistant hosts, microorganisms and the larger parasites and predators. Credit, 3.
One class hour; two 2-hour laboratory periods. Mr. Sweetman.
Prerequisites, Entomology 35, 155, and 157; 179 and 181 desirable.

181. Insect Physiology.—Detailed consideration is given to the organ systems, showing the functions such as nutrition, respiration, and growth, and the relationship of physiology to behavior. Credit, 3.
One class hour; two 2-hour laboratory periods. Mr. Sweetman.
Prerequisite, Entomology 26; 155, 156, and 157 desirable.

190. Evolution.—A course in orientation. Lectures consider evolution of both organic and inorganic matter with attention to the evolution of human behavior and to the effect of evolutionary concepts on human philosophy. Extra supplementary reading required of graduate students. Credit, 3.
Mr. Hanson.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Entomology)

166. Introductory Beekeeping. Credit, 3.
Mr. Shaw.

Plant Pathology

Walter Banfield and Richard Rohde, major advisers.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Selected research problems in plant pathology. Credit, 1-5.
The Staff.

204. Forest Pathology.—The diseases of trees and the decay of forest products. Credit, 4.
Prerequisites, Plant Pathology 151 and Botany 166. Mr. Banfield.

205, 206. Advanced Plant Pathology.—The biological problems that underlie the diseased state in plants and the development of disastrous epiphytotics. Credit, 2-4 each semester.
MR. BANFIELD.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151, 152. Plant Pathology.—The nature, causes and control of plant diseases. Credit, 3 each semester.
MR. BANFIELD.

169. Forest and Shade Tree Pathology.—The nature, cause and control of the principal types of disease in trees including decay of forest products, standing and structural timber. Credit, 3.
MR. BANFIELD.

175. Methods in Plant Pathology.—General techniques and specialized methods used in the investigation of plant diseases. Credit, 3.
1960-61 and each alternate year.
Prerequisite, one semester of Plant Pathology. MR. BANFIELD.

178. Nematology.—Anatomy, morphology and classification of plant-parasitic and other soil-inhabiting nematodes. Parasitic relationships with plants and current control measures will be stressed. Credit, 3.
Prerequisite, a year of biological science. MR. ROHDE.

190. Insect Transmission of Plant Diseases.—Lectures on intricate interrelationships of insects, plants, and microorganisms, with particular emphasis on the basic role played by insects in inception, distribution and perpetuation of plant diseases. Credit, 3.
MR. BANFIELD.

FOOD SCIENCE AND TECHNOLOGY

Graduate Faculty: W. B. ESSELEN, Head of Department, H. M. EL-BISI, I. S. FAGERSON, F. J. FRANCIS, K. M. HAYES, H. O. HULTIN, A. S. LEVINE, W. W. NAWAR, F. M. SAWYER.

Graduate students who wish to major in Food Science and Technology may not be admitted to candidacy for an advanced degree until such time as the undergraduate requirements in basic sciences and Food Technology have been met substantially.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Research Problem.—Mainly for candidates for the Master of Science degree who do not write a thesis. Original research expected. The problem will be carried out as a thesis but will be less extensive. Two bound copies (flexible binding permissible) of a written report of the study are required by the Department. Credit, 3-6.
THE STAFF.

203. Research Project.—Research on problems not related to the thesis. For Ph.D. candidates only. Credit, 1-4.
THE STAFF.

209, 210. Sporology and Thermoprocessing of Foods.—Biological and Physical Aspects. The factors affecting heat transfer in canned goods. Heating characteristics of canned goods packed in tin, glass, and other containers. Determination of thermal death times of spoilage microorganisms. Derivation of processing times and temperatures. Causes of spoilage and container failure. Principles of retort operation and control; instrumentation.
First semester—3 lectures or conferences. Credit, 3.
Second semester—1 lecture, one 4-hour laboratory. Credit, 3.
Prerequisites, Food Science and Technology 162 and Bacteriology 182.
MR. EL-BISI.

216. Food Packaging.—The characteristics of all packaging materials including flexible films and how they meet the package requirements of various food products. Methods of testing for structural quality and performance, moisture and gas transmission, and other properties. Consideration of adhesives, lacquers and closures. Occasional lectures by qualified representatives of industry. Plant visits in non-scheduled hours. One 4-hour laboratory period; one or more class or discussion hours.
Credit, 3.
Prerequisite, Food Science and Technology 162. MR. LEVINE

221. Lipid Chemistry.—Structure and composition of edible fats and oils. Chemical and physical behavior. New methods of analyses. Causes of deterioration and methods of stabilization. Biological significance and role in nutrition. Discussion of recent advances in lipid research. Credit, 3.
MR. NAWAR.

241. Advanced Food Analysis.—Objective methods of evaluation of food constituents and characteristics. Physical and chemical means of expressing quality of a product. Application of analytical instrumental methods including paper and gas chromatography, infrared spectrophotometry, radioactive tracer techniques, etc. Credit, 3.
One lecture; one conference. MR. FAGERSON.
Prerequisites, Food Science and Technology 192 and 198; Biochemistry 194.

250. Food Colorimetry.—Methods of expressing reflection and transmission colorimetry in terms of the Munsell, C.I.E., Adams, Hunter and other color solids. Interpretation of color changes in terms of the composition and properties of food pigments and colorants. The nature, cause and control of color changes in the handling, processing and storage of food products.
One lecture; one 4-hour laboratory. Credit, 3.
Prerequisites, Food Science and Technology 191 and 192. MR. FRANCIS.

271, 272. Seminar.— Review of current literature and research. Visiting lecturers. Credit, 1 each semester.
Maximum credit, 6.
MR. EL-BISI.

295. Biological and Toxicological Assay of Foods.—Laboratory training and practice in making animal and microbiological assays of food

constituents important in human and animal nutrition. Added chemicals in foods. Credit, 2-5.
Prerequisites, Chemistry 179 and Food Science and Technology 192.
Mr. Sawyer.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161, 162. Industrial Practices.—Advanced laboratory and pilot plant work in the production of canned, frozen and dehydrated fruits, vegetables, meat, and fish products. The theory and practice in manufacturing food products including soups, condiments, and cereal products are presented. Principles of fermentation, salting, and smoking are stressed. One class hour; one 4-hour laboratory period. Credit, 3 each semester.
Prerequisite, Food Science and Technology 152. Mr. Levine.

191, 192. Analysis of Food Products.—Factory and laboratory methods. Grades and quality factors; physical, chemical, microbiological and microscopical methods, and interpretation of results. Government and trade standards; Federal and State food regulations; mold and insect counts; plant control procedures. Food preservatives and flavorings.
One 4-hour laboratory period, two class hours. Credit, 3 each semester.
Prerequisites, Chemistry 30 and Food Science and Technology 152 or 175.
Mr. Hunting.

198. Sensory Evaluation Methods.—An introduction to sensory measurements in the evaluation and acceptance of foods. Panel tests and their statistical interpretation; taste, odor, color, and texture measurements; application to food quality control and grading. Credit, 2.
One class hour; one 2-hour laboratory period. Mr. Sawyer.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Food Science and Technology)

151. Introductory Course.—A basic course covering food production, processing, distribution, and spoilage. The application of the fundamental sciences to the food industries. Laboratory exercises cover both the theory and practice of food processing and preservation. Credit, 3.
Two class hours; one 2-hour laboratory period. Mr. Hultin.

152. Food Chemistry.—An introduction to the chemistry of food products with special emphasis on the changes that occur during processing, storage, and distribution, and on the methods used to prevent these changes. The use of enzymes in food processing. Laboratory exercises demonstrate the principles involved. Credit, 3.
Two class hours; one 4-hour laboratory period alternate weeks.
Mr. Hultin.

175. Food Preservation.—Intended only for those who desire a survey of the field in a condensed form. Not open to Food Science and Technology majors. Credit, 3.
Two class hours; one 2-hour laboratory period. Mr. Hultin.

FORESTRY

Graduate Faculty: A. D. Rhodes, Head of Department, H. G. Abbott, H. B. Gatslick, W. P. MacConnell, D. L. Mader.

Applicants for admission who plan to major in forestry customarily should have completed an undergraduate major in that field. An exception may be made in the case of individuals having a strong background in a related discipline or the basic sciences. Candidates for a Master's degree majoring in forestry ordinarily must complete a thesis; exceptions will be made in unusual circumstances. Emphasis may be in the area of forest soils, forest ecology, silviculture, resource management, forest economics, marketing, or wood technology.

Facilities for instruction and research include the newly constructed and well equipped Holdsworth Natural Resources Center, a sawmill, dry kiln, and several thousand acres of University-owned and other available forest land within ten miles of the campus.

Although the Department does not offer the Ph.D. degree, it is possible by cooperative arrangement with other departments such as Botany and Agronomy for the student to receive his doctorate in one of these departments based on a thesis project carried out in some phase of forestry.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Selected research problems in forestry not related to the candidate's thesis. Credit, 3.
The Staff.

201. Advanced Forest Soils.—The relation of soils to tree growth and other environmental factors with particular emphasis on research methods, site evaluation, water relationships, and fertility; laboratory and field exercises. Credit, 3.
Prerequisite, Forestry 154 or equivalent. Mr. Mader.

202. Aerial Photo-Interpretation.—Advanced aerial photo-interpretation emphasizing the analysis of natural vegetation, especially forest vegetation; a wide selection of aerial photographs is available for interpretive study and cartography. Credit, 3.
Prerequisite, Forestry 171 or equivalent. Mr. MacConnell.

203. Advanced Forest Ecology.—Research methods and instrumentation in forest ecology; forest influences with special emphasis on the effect of micro-climate on site quality and the management of watersheds.
Prerequisite, Forestry 153 or equivalent. Credit, 3.
Mr. Mader.

204. Advanced Silviculture.—Growth and reproductive characteristics and requirements of trees and forest stands as they affect silvicultural management, particularly in relation to thinning and the establishment of forest regeneration. Credit, 3.
Prerequisites, Forestry 153, 154, and 156 or equivalents. Mr. Rhodes.

205. Research Concepts in Forest Biology.—A study of the development of biological knowledge relating to forestry from both the historical and philosophical points of view with special emphasis on con-

tributions of contemporaneous scientific research. Given in alternate years. Credit, 3.
Mr. Abbott.

206. Advanced Forest Mensuration.—Regression analysis applied to stand and tree volume determination, stand growth and yield, forest site evaluation, and related measurement problems. Computer techniques will be used to solve some of the computational problems. Credit, 3. Prerequisites, Forestry 155 and 184 or equivalents. Mr. Mawson.

207. Advanced Forest Management.—Economic evaluation of forest enterprises; appraisal of rates of return, damage, and stumpage values. Prerequisite, Forestry 180 or equivalent. Credit, 3.
Mr. MacConnell.

208. Micro-Economics of Forestry I.—Principles of micro-economics as applied to forestry problems with special emphasis on marginal analysis in regard to land, labor, and capital. Credit, 3. Prerequisite, Forestry 157 or equivalent. Mr. Bond.

209. Micro-Economics of Forestry II.—A continuation of Forestry 208 with emphasis on supply and demand, marketing, taxation, and social problems in relation to the forest economy. Credit, 3.
Mr. Bond.

210. Chemical Modification of Wood.— Basic concepts and techniques concerning the chemical modification of wood; the potential and limitations of physical and chemical treatments as they affect the dimensional stability and durability of wood. Credit, 3. Prerequisites, Organic Chemistry, Forestry 52. The Staff.

300. Thesis, Master's Degree. Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDFNTS
(For either major or minor credit)

152. Properties of Wood.—The physical and chemical characteristics of wood in relation to its use; the influence of growth upon wood properties; methods of testing. Credit, 3.
Mr. Hoadley.

153. Silvics.—Forest ecology as a function for silviculture; environmental factors and their effect upon vegetation; development and classification of trees and forest communities; forest influences. Credit, 3.
Mr. Mader.

154. Forest Soils.—Effects of soil properties on tree growth; relationship of soils to silviculture, harvesting, watersheds, wildlife, and range management; forest soil description, classification and mapping. Prerequisite, Agronomy 22. Credit, 3.
Mr. Mader.

155. The Elements of Forest Mensuration.—The measurement of trees, stands, and forest products; field and office practice in timber estimating and log scaling; collection and compilation of forest inventory data. Given each summer, and in alternate years the first semester. Credit, 3.
Mr. Mawson and Mr. MacConnell.

FORESTRY

156. The Principles of Silviculture.—Establishment and culture of forests for the production of wood crops; regeneration and intermediate cuttings, chemical silvicides, prescribed burning, site treatment, slash disposal. Credit, 3.
Prerequisite, Forestry 53 recommended. Mr. Rhodes.

157. Forest Economics and Policy.—Development of land use and legislation affecting forest policy in the U. S. Timber resources distribution, consumption and demand, taxation, credit, and social-economic factors. Credit, 3.
Mr. Bond.

159. Forest Protection.—Principles of protecting forests from fire, insects, diseases, domestic animals, wildlife, and atmospheric agencies with special emphasis on the prevention and control of forest fires. Credit, 3.
Mr. Abbott.

171. Aerial Photogrammetry.—Principles of photogrammetry in forest management, wildlife biology, and other fields concerned with large land surfaces. Photographic interpretation and map making from aerial photographs. Credit, 3.
Mr. MacConnell.

174. Lumber Manufacture and Distribution.—The lumber industry; milling and processing, log and lumber grading, lumber storage and distribution. Credit, 3.
Mr. Hoadley.

175. Forest Products.—A survey of the principal forest products, their manufacture and distribution. Credit, 3.
Mr. Gatslick.

178. Harvesting of Forest Products.—Basic concepts of harvesting methods with emphasis on supervision. Field exercises in harvesting techniques followed by a week's trip visiting industrial forest operations.
Three 44-hour weeks in the summer. Credit, 3.
Mr. Bond and Mr. MacConnell.

180. Principles of Forest Management.—Multiple-use management of forest land, organization of the forest for sustained-yield management. Preparation of a management plan for a 10,000-acre forest. Laboratory period optional for non-forestry majors. Credit, 3-5.
Prerequisite for the laboratory, Forestry 55. Mr. MacConnell.

182. Artificial Propagation of Forests, and Forest Tree Improvement.—Reproductive characteristics of trees; artificial propagation of forest stands by direct seeding and planting; nursery management; and forest tree improvement through provenance tests, selection and hybridization. Credit, 3.
Mr. Abbott.

184. Forest Survey and Sampling Design.—The theory and application of sampling techniques in forest survey and research problems including simple random, stratified, sub-sampling, representative, and probability sampling. Credit, 3.
Mr. Mawson.

185. Wood Seasoning and Preservation.—Properties of wood in relation to drying and preservation; theory and practice of air seasoning, kiln drying, and preservative treatment. Credit, 3.
MR. GATSLICK.

195. Seminar.—Specialized study in a selected area of forestry or wood technology. Credit, 1-3.
THE STAFF.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT MAY BE GIVEN

When appropriate for the student's program of instruction and research, and with the consent of the student's advisor, major credit will be given for certain courses in the following subject-matter areas: Agricultural and Food Economics, Agronomy and Soil Science, Botany, Business Administration, Chemistry, Economics, Engineering, Entomology, Geology, Horticulture, Landscape Architecture, Mathematics, Physics, Plant Pathology, Recreation, Statistics, Wildlife and Fisheries, and Zoology.

GEOLOGY

Graduate Faculty: H. T. U. SMITH, Head of Department, O. C. FARQUHAR, G. E. MCGILL, W. S. MOTTS, P. ROBINSON, G. W. WEBB.

Requirements for the M.S. degree are as follows:

1. A minimum of 60 credits in geology, including both undergraduate and graduate work.
2. Courses in related sciences equivalent to those required for undergraduate majors: one year each of chemistry and physics, one semester of zoology, and mathematics through calculus.
3. Proficiency in technical writing.
4. At least six weeks of training in field geology.
5. Graduate credits in geology as required by the Graduate School.
6. A qualifying examination on knowledge of general geology, including field and laboratory techniques and sources of geologic information.
7. A thesis based at least in part on field study, and representing an original contribution to geologic knowledge.
8. A final examination, emphasizing defense of the thesis, together with a more advanced knowledge of the field or fields which represent background for the thesis.

At the beginning of the first semester in residence, new graduate students are given placement examinations covering fields of geology included in their undergraduate program. These examinations provide a partial basis for planning the student's course of study.

Requirements for the Ph.D. degree, in addition to general requirements of the Graduate School, are as follows:

1. Ordinarily the doctoral candidate is assumed to have received the Master's degree or equivalent training; however, selected students with outstanding records may be accepted provisionally with the

Bachelor's degree only, and proceed more directly toward meeting doctoral requirements.

2. Basic training in physics, chemistry, mathematics, and biology, and additional work in at least one of these fields.
3. At least 6 months of approved field training and experience.
4. A broad knowledge of fundamental concepts, methods of investigation, and historical development of geologic science.
5. Mastery of an elected field or fields of specialization.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Either or both of the following options may be selected:

A. Independent study—guided reading and/or laboratory study in subjects or techniques not covered by other courses in the department.
B. Research—original library, field, and/or laboratory investigation of a selected problem.

Prerequisites, 45 credits in geology and consent of department head and of instructor concerned. Credit, 2-6.
THE STAFF.

201. Optical Mineralogy.—Theory and practice of studying minerals with the petrographic microscope. Laboratory work includes preparation of thin sections of minerals and rocks and study of their optical properties by means of polarized light. Credit, 3.
Prerequisites, Geology 42, Physics 25 and 26. MR. NELSON.

202. Advanced Mineralogy.—Physical and chemical characteristics of minerals and methods of laboratory investigation, including X-ray, differential thermal analysis, and microchemical techniques. Credit, 3.
Prerequisites, Geology 201 and permission of instructors. THE STAFF.

203. Igneous Petrology.—Description, classification, origin, and alteration of igneous rocks. Examination of rocks in hand specimen and in thin section under the microscope. 1962-63 and each alternate year. Credit, 3.
Prerequisites, Geology 156 and 201. MR. ROBINSON.

205. Sedimentary Petrology.—Description, classification, and origin of sedimentary rocks; laboratory study of structure, texture, and composition using the microscope and other analytical techniques. Credit, 2.
Prerequisites, Geology 201 and 174. MR. WEBB.

206. Metamorphic Petrology.—Description, classification and origin of metamorphic rocks. Microscopic study of suites of thin sections.
1962-63 and each alternate year. Credit, 3.
Prerequisites, Geology 156 and 201. MR. ROBINSON.

212. Sedimentation.—A critical analysis of modes of origin of the several types of sedimentary rocks. Credit, 3.
Prerequisites, Geology 174 and 178. MR. WEBB.

213. Geophysics.—The physics of the earth and the gravitational, magnetic, electrical, and seismic methods of geophysical exploration. Laboratory work consists of problems and computations. Credit, 3.
Prerequisites, Geology 33 and 156; Math 4; Physics 25 and 26. MR. RICE.

214. **Petroleum Geology.**—Geologic occurrence of oil and gas. Laboratory work consists of problems related to reservoir and trap conditions and to methods of subsurface study. Credit, 3.
Prerequisites, Geology 33, 42 and 178; 234 desirable. MR. WEBB.

216. **Metalliferous Economic Geology.**—Nature, origin, and distribution of metalliferous ores. Criteria for recognition of ore deposits, changes in character of ore with depth, mineral associations, and types of wall-rock alteration. Optical and microchemical properties of ore minerals and ore concentrates.
Given in alternate years. Credit, 3.
Prerequisites, Geology 33, 42 and 156; 203 desirable. MR. FARQUHAR.

217. **Non-metalliferous Economic Geology.**—Geology, distribution, and utilization of non-metallic mineral deposits, including coal and other solid hydrocarbons.
Given in alternate years. Credit, 3.
Prerequisites, Geology 33, 42, 156, 178 and 201. MR. FARQUHAR.

218. **Ground-Water Geology.**—Theoretical and practical ground-water geohydrology and its relation to geomorphology, glacial geology, sedimentology, and engineering geology. Credit, 3.
Prerequisites, Chemistry 1 and 2, 15 hours of geology; 78 and 94 recommended. MR. MOTTS.

220. **Stratigraphic Paleontology.**—Application of selected fossils and faunal assemblages to stratigraphic correlation, and paleoecological and paleogeographic analysis, with reference to evolutionary trends.
1962-63 and each alternate year. Credit, 2.
Prerequisites, Geology 163 and 178. MR. JOHANSSON.

221. **Animal Micropaleontology.**—Principles of animal micropaleontology with emphasis on the use of animal microfossils in stratigraphic investigations.
1963-64 and each alternate year. Credit, 3.
Prerequisites, Geology 163 and 178. MR. JOHANSSON.

222. **Plant Micropaleontology.**—Principles of plant micropaleontology with emphasis on the use of plant microfossils in stratigraphic investigations. Credit, 3.
MR. JOHANSSON.

225. **Cenozoic Stratigraphy.**—Occurrence, correlation, and origin of marine and terrestrial Cenozoic deposits and their relation to paleogeographic and tectonic conditions, with particular reference to North America. Credit, 3.
Prerequisites, Geology 178 and 189; 234 recommended. MR. WEBB.

227. **Marine Geology.**—Physical characteristics and geological processes of the ocean basins and margins, and their bearing on interpretation of geologic history. Credit, 3.
Prerequisites, Geology 178 and 194. MR. WEBB.

228. **Map Interpretation.**—A laboratory study of the various types of maps used by geologists, with special reference to the identification and interpretation of landforms and structures. Credit, 2.
Prerequisites, Geology 33, 172 and 189. MR. SMITH.

GEOLOGY

230. Advanced Geomorphology.—A critical study of selected topics and current problems in geomorphology. Credit, 2.
Prerequisite, Geology 189. Mr. Smith.

232. Physiography of North America.—A survey of the physiographic provinces of North America and their evolution, with emphasis on problems and methods of approach. Credit, 3.
Prerequisites, Geology 189; 234 desirable. Mr. Motts.

234. Regional Geology of North America.—Tectonic concepts as exemplified by the stratigraphic and structural evolution of North America.
Prerequisites, Geology 2, 33 and 178. Credit, 3.
Mr. McGill.

235. Appalachian Geology.—Field and library study of regional tectonics and geologic history of New England and other Appalachian areas, with emphasis on controversial problems; several field trips, including one extended trip during spring vacation. Credit, 2.
Prerequisite, permission of instructors. Mr. McGill and Mr. Robinson.

236. Advanced Structural Geology.—Dynamics and mechanics of rock deformation, including theoretical and experimental studies, with field applications. Credit, 3.
Prerequisites, Geology 33, 172 and 178.

238. Advanced Photogeology.—A laboratory study of surface expression as a key to subsurface phenomena as illustrated by specific areas.
Prerequisites, Geology 189 and 191. Credit, 2.
Mr. Smith.

241. Seminar.—Review of current literature or discussion of selected topics. Credit, 1 each semester.
Maximum credit, 2.
The Staff.

245. Evolution of Geologic Concepts.—Perspective on current geological thought in the light of its historical background; particular attention to controversial questions and to the rise and decline of ruling theories.
Prerequisite, one year of graduate study. Credit, 2.
Mr. Motts.

250. Geochemistry.—Principles of geochemistry and interpretation of geochemical data in relation to geological processes and to the origin and history of the earth. Credit, 2.
Prerequisites, Geology 42, 156, one year of college chemistry and permission of instructor. Mr. Nelson.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

178. Principles of Stratigraphy.—Principles of stratigraphic correlation as related to the major rock units of the United States and Europe.
Prerequisite, Geology 174. Credit, 3.
Mr. Webb.

189. Geomorphology.—Origin and development of landforms in relation to geological processes, climatic environment, and tectonic history. Application of geomorphic methods to interpretation of Cenozoic geologic history.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisites, Geology 1, 2 and 33. Mr. Smith.

191. Photogeology.—A laboratory study of the instruments and methods employed in making measurements and preparing base maps and geologic maps from vertical and oblique aerial photos.
Two 3-hour laboratory periods. Credit, 3.
Prerequisites, Geology 33 and 172. Mr. Smith.

194. Pleistocene Geology.—Geochronology of Pleistocene time as related to climatic changes and their influence on glaciology, erosional and depositional processes, landforms, sedimentary deposits, shifting sea level, and the paleontological record. Field trips by arrangement. Credit, 3.
Two class hours; one 2-hour laboratory period. Mr. Motts.
Prerequisites, Geology 1 and 2.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Geology)

150. Engineering Geology.—Materials and surface features of the earth and their relation to engineering problems; map reading as related to the phenomena of physical geology. Credit, 3.
Two class hours; one 3-hour laboratory period. Mr. Farquhar.

156. Lithology.—A descriptive study of the classes of rocks with reference to manner of origin, modes of occurrence, structural features and the chemical and petrographic distinction within each group. Credit, 3.
One class hour; two 2-hour laboratory periods. Mr. Nelson.
Prerequisites, Geology 1 and 42.

163. Invertebrate Paleontology.—History, development and identification of invertebrate animal fossils. Field trips by arrangement.
Prerequisites, Geology 2 and Zoology 1 or Biology 4 or 5. Credit, 3.
Mr. Johansson.

164. Plant Paleontology.—History, development and identification of plant fossils. Field trips by arrangement. Credit, 3.
Mr. ———.

172. Geologic Field Mapping.—An introduction to the instruments and techniques used in field mapping, and their application to the geologic mapping of selected areas. Eight field hours, by arrangement. Credit, 3.
Prerequisites, Geology 33 and 156, or permission of instructor.
Mr. Robinson.

174. Sedimentology.—Composition, classification, and origin of sedimentary rocks, including discussion of source area, mode of transportation, deposition and diagenesis. Credit, 2.
Prerequisites, Geology 1, 2 and 42. Mr. Motts.

GERMAN AND RUSSIAN

German

Graduate Faculty: F. C. Ellert, Head of Department, R. Hauser, P. Heller, E. Schiffer, H. J. Weigand.

Master of Arts

Prerequisites for admission: A. B.A. degree with a major in German language and literature and indication of ability to do successful graduate work. Deficiencies in literary background and insufficient command of spoken or written German must be made up before the candidate can be admitted to certain courses required for the degree.

Languages: For this degree the student must have, or must acquire, a reading knowledge of at least one major language, modern or ancient, other than German and English.

Program of study: A minimum of twenty-one credits in the major field. Twelve of these credits must be earned in "courses open to graduate students only" (200 series), unless a student chooses to offer a thesis in place of six of these credits. The "Proseminar" is required. One course must be of linguistic character; this will normally be the course in Middle High German.

Cooperative Ph.D. Degree in German

In order to enroll for this program candidates must satisfy a Screening Committee as to their qualifications for advanced work in the field. Language requirements include a reading knowledge of French and of an additional language (other than German or English) pertinent to the candidate's field of specialization. Study programs for Ph.D. candidates, which must include 1) Old High German or Gothic and 2) Middle High German, will be determined by the Guidance Committees.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Problems Course.—Directed study in some special area of literature or linguistics. Credit, 3.
The Staff.

201. Middle High German.—Readings in Middle High German Literature in the original with an introduction to the grammar. Credit, 3.
Mr. Schaefer or Miss Schnieders (Smith).

202. German Literature in the Middle Ages.—A study of German literature from the earliest literary documents to the 15th century. Credit, 3.
The Staff.

204. Germanic Philology.—Gothic, Old High German. Credit, 3.
Miss Duckert, Mr. Schaefer or Miss Schnieders (Smith).

206. The Age of Humanism and the Reformation.—German literature between 1400 and 1600; *Der Ackermann aus Böhmen,* Brant, Murner, Hutten, Luther, Hans Sachs. Credit, 3.
Mr. Ellert.

211. The Age of Enlightenment with special reference to Lessing. Credit, 3.
Mr. Heller or Mr. Scenna (Amherst).

213. Young Goethe.—A close survey of Goethe's work prior to the Weimar period. Credit, 3.
Mr. Ellert or Mr. Weigand.

214. The Classical Goethe. Credit, 3.
Miss Schiffer or Mr. Weigand.

221. Schiller.— A study of his life and works. Credit, 3.
Mr. Weigand.

225. The German Bildungsroman.—Goethe, Novalis, Keller, Stifter, Mann, Hesse. Credit, 3.
Miss Schiffer, Mr. Lettau (Smith), or
Miss Runge (Mt. Holyoke).

230. Heine and his Age. Credit, 3.
Mr. Ellert or Mr. Weigand.

235. The Drama of the Romantic Period.—Comprehensive treatment of the works of Tieck, Kleist and Grillparzer. Credit, 3.
The Staff.

236. The Realistic Drama.—Comprehensive treatment of the works of Hebbel, Büchner and Hauptmann. Credit, 3.
Mr. Hauser or Mr. Graham (Smith).

240. Lyrical Poetry of the XXth Century.—Intensive study of the works of George, Hofmannsthal and Rilke. Credit, 3.
Miss Schiffer or Mr. Weigand.

245. Nihilism and Affirmation in Contemporary Literature.—A study of drama, fiction and essays reflecting the crisis of the modern age, with special emphasis on the period of Expressionism. Credit, 3.
Mr. Ellert, Mr. Heller, Mr. Lea or
Mr. Peppard (Amherst).

255. Stylistics.—An advanced course in German composition, audio-lingual proficiency, literary interpretation, and grammar. Credit, 3.
Mr. Heller, Mr. Lettau (Smith) or
Miss Schiffer.

270. Proseminar.—Introduction to methods of literary interpretation, research and criticism. Reports and papers on texts selected from the works of major German authors and critics (e.g., Lessing; Romantic criticism; Nietzsche; Mann; Kafka). Close discussion of secondary sources in the field of literary scholarship (e.g., W. Kayser's *Das sprachliche Kunstwerk;* E. Staiger's *Kunst der Interpretation*). Required of all majors. Credit, 3.
The Staff.

280. Seminar.—Close study of a single topic, author or work. One of the main purposes of the course is to suggest projects for independent research to advanced students. The subject matter will vary from year to year. (Topics proposed for 1962-65: Novalis; The Poetry of Hölderlin; Friedrich Schlegel's criticism; E. T. A. Hoffmann's *Märchen;* Rilke's *Duineser Elegien;* Werfel). Credit, 3.
The Staff.

300. Thesis, Master's Degree. Credit, 6-9.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151. Nineteenth Century Prose.—German prose from the death of Goethe to 1890 (early realism to naturalism) with emphasis on literary and social forces in the works of Stifter, Keller, Fontane, and others. Three class hours. Credit, 3.
MR. WEIGAND.

152. Poetry and Drama of the Nineteenth Century.—The development of the drama and of lyric poetry from 1830 to 1890 with special emphasis on dramatic works of Grillparzer, Hebbel, and Büchner and the poetry of Mörike and C. F. Meyer. Credit, 3.
Three class hours. MR. HAUSER.

153. Twentieth Century Prose.—Main literary currents in contemporary German prose from Nietzsche to Hesse with particular attention to the works of Thomas Mann, Kafka, and Werfel. Credit, 3.
Three class hours. MR. HELLER.

154. Poetry and Drama of the Twentieth Century.—Reading and discussion of significant lyrical works of Hofmannsthal, George, and Rilke, and representative dramas by Hauptmann and Georg Kaiser. Credit, 3.
Three class hours. MR. LEA.

155. Storm and Stress.—Storm and stress in German literature centering in the young Goethe. Credit, 3.
Three class hours. MR. ELLERT.

156. Romanticism.—The poetry and prose writings of the romantic period from Novalis to Heine. Credit, 3.
Three class hours. MISS SCHIFFER.

157. Goethe's Faust. Credit, 3.
Three class hours. MR. ELLERT, MR. HELLER OR MR. WEIGAND.

159. The Germanic Languages.—An introduction to General and Germanic philology for German and English majors; a survey of the relationship between German, English, and the other Indo-European tongues and of the historical development of German and English as the two major Germanic literary languages. Credit, 3.
Three class hours. MR. SCHAEFER.

160. The Classical Period.—Representative works by Lessing, Goethe, and Schiller. Credit, 3.
Three class hours. MR. WEIGAND.

Comparative Literature

191. Anglo-German Literary Relationships Since 1750. Credit, 3.
Three class hours. MR. HELLER, MR. PAGE OR MR. WEIGAND.

Linguistics

193. Linguistics.—A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature. Credit, 3.
Three class hours. MISS DUCKERT.

Russian

153. (I), 154. (II) Dostoevsky and Tolstoy in their European Setting.—Each semester the important works of one author will be studied. Prerequisite, Proficiency in Russian. Credit, 3. Three class hours. The Staff.

156. (II) Russian Drama.—Drama in the originals, from the beginnings to the establishment of a national theatre culminating in plays of Ostrovskij, Chekhov, Gorky. Credit, 3. Prerequisite, Proficiency in Russian. The Staff. Three class hours.

157. (I) Soviet Literature.—A representative study of the beginnings and development of Soviet prose, drama and criticism from Gorky to Sholokhov and Pasternak. Credit, 3. Prerequisite, Proficiency in Russian. The Staff. Three class hours.

158. (II) Russian Poetry.—Russian poetry in the originals, from the early days of the 19th century to the present, with an emphasis on the major poetic trends. Credit, 3. Prerequisite, Proficiency in Russian. The Staff. Three class hours.

164. (II) The History of the Russian Language.—A description of the historical development of the Russian language (and its relation to other languages) from the earliest period to the present. Credit, 3. Prerequisites, Russian 62, Junior or Senior standing. Three class hours.

GOVERNMENT

Graduate Faculty: J. S. Harris, Head of Department, L. P. Beth, G. Braunthal, J. Fenton, F. E. Oppenheim, G. Tinder, F. A. Vali.

In addition to the general requirements for the Master of Arts degree, candidates in Government must possess a reading knowledge of a foreign language approved by the department or an adequate knowledge of statistics where appropriate. An acceptable master's thesis is also required.

Study programs for Ph.D. candidates will be determined by the Guidance Committees—the designation of fields in political science to be covered and the selection of courses in the minor field or fields.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems. Credit, 1-6.

250. Public Administration: Organization.—Behavior within governmental bureaucracy, in terms of the interaction between the individual and organization influences. Credit, 3. Prerequisite, Government 161 or 178. Mr. Harris or Mr. Mainzer.

251. Public Administration: Responsibility.—Problems of political responsibility of government bureaucracy within specific constitutional systems. Credit, 3. Prerequisite, Government 161 or 178. Mr. Harris or Mr. Mainzer.

260. Problems of International Relations.—Analysis of major problems in international relations. Credit, 3.
Prerequisite, Government 153. MR. VALI OR MR. BRAUNTHAL.

261. Problems of International Law and Organization.—Analysis of major problems in international organizations. Credit, 3.
Prerequisite, Government 168 or 170. MR. VALI OR MR. BRAUNTHAL.

270. Seminar in Public Law.—A study of selected topics in public law.
Prerequisites, Government 164, 165 or equivalent. Credit, 3.
MR. BETH.

271. Law and the Political Process.—The interrelationships between law and politics, and the necessity for law in organized societies. Credit, 3.
Prerequisite, Government 164 or 165 or equivalent. MR. BETH.

275. Politics and the Legislative Process.—Selected topics relating to American politics, political parties, elections and the legislative process.
Prerequisite, Government 163. Credit, 3.
MR. FENTON AND MR. GOODWIN.

276. Research in Political Behavior.—Introduction to research techniques as applied to special problems in the field of political behavior. Emphasis upon various approaches to the study of the individual voter, the American politician, interest groups and legislatures. Credit, 3.
MR. FENTON AND MR. GOODWIN.

277. Directed Studies in Politics.—The study in depth of a particular aspect of political behavior. The content of this course will vary with the particular research interests of the instructor and the students.
Credit, 3.
MR. FENTON OR MR. GOODWIN.

280. Recent Political Theory.—The major trends of twentieth-century political theory will be surveyed; in addition, intensive analysis of selected thinkers of this period will be carried out. Credit, 3.
MR. OPPENHEIM OR MR. TINDER.

281. Selected Problems in Political Theory.—An examination of significant problems within the field of political theory. Students will be asked to study traditional solutions and to devise original solutions.
Credit, 3.
MR. OPPENHEIM OR MR. TINDER.

290. Comparative Government.—An historical and functional analysis of the institutions of government in modern democracies and dictatorships.
Prerequisite, Government 26. Credit, 3.
Three class hours. MR. ALLEN, MR. BRAUNTHAL OR MR. HARRIS.

291. Comparative Political Parties and Politics.—The ideology, structure and dynamics of diverse types of political parties, party systems and electoral systems, in an effort to suggest interrelationships. Credit, 3.
Three class hours. MR. ALLEN, MR. BRAUNTHAL OR MR. HARRIS.

292. Seminar in Comparative Government.—Intensive study of selected political systems and of particular governmental institutions and processes. Credit, 3.
Three class hours. MR. ALLEN, MR. BRAUNTHAL OR MR. HARRIS.

293. Seminar on the Government and Politics of South Asia.—Intensive study of selected problems relating to the government and politics of India, Pakistan, and Ceylon. Credit, 3.
Three class hours. MR. SAYEED.

300. Thesis, Master's Degree. Credit, 6.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151. Municipal Government.—A survey of the governmental structure and function of American municipalities. Credit, 3.
Three class hours. MR. GRADY.

152. American Foreign Policy.—Constitutional, political and administrative considerations which influence the formulation and execution of American foreign policy. Special emphasis on current issues. Credit, 3.
Three class hours. MR. BRAUNTHAL AND MR. ALLEN.

153. International Relations.—The nation-state system and conceptions of national interest in modern world politics. The forms and distribution of power by which states seek to implement national interests. The making of foreign policy and methods of adjusting international conflict. Current international problems. Credit, 3.
Three class hours. MR. BRAUNTHAL, MR. VALI AND MR. ALLEN.

154. State Government.—State politics, organization and functions with emphasis on the role of the state in our federal system. Credit, 3.
Three class hours. MR. FENTON.

155. The Presidency in American Government.—The growth of the executive in United States Government. Varying conceptions of the presidential office. Constitutional and political aspects of the office in legislation, administration and conduct of foreign and military affairs. The president as a party leader. Credit, 3.
Summer School only. MR. GOODWIN.

156. The Legislative Process.—The role of the legislature in national and state government. The functions of legislatures; legislative procedures; the role played by political parties and pressure groups in the legislative process.
Emphasis on research. Credit, 3.
Three class hours. MR. GOODWIN OR MR. FENTON.

157. The Government and Politics of Russia.—The development, organization and functioning of the Communist party; governmental organization and the administrative process; terror as a system of power; organization for governmental control in industry and agriculture; Soviet foreign policy; its formation and execution. Credit, 3.
Prerequisite, Government 25. MR. VALI.

161. Public Administration.—Organization and management in modern government, with emphasis on the bureaucracy's role in public formation.
Three class hours. Credit, 3.
MR. MAINZER.

GOVERNMENT

162. Administrative Law.—Governmental activities in the regulation of industry, agriculture, and labor, with emphasis on the legal framework within which these activities operate. Credit, 3.
Three class hours. Mr. Mainzer.

163. Political Parties and Elections.—The American political process, with emphasis on parties, pressure groups, and public opinion.
Three class hours. Credit, 3.
Mr. Goodwin.

164. Civil Liberties.—A study of the development in American Constitutional Law of the concept of civil liberty, including the following fields: free speech and religion, fair trial, and race discrimination. The function of courts in the safeguarding of these liberties. Credit, 3.
Prerequisite, Government 25. Mr. Beth.

165. Constitutional Law.—A study of the United States Constitution as interpreted by decisions of the Supreme Court. Credit, 3.
Three class hours. Mr. Beth.

166. American Political Thought.—The development of American political thought from Colonial times to the present. Credit, 3.
Three class hours. Mr. Oppenheim.

168. International Law.—The origin, character, and function of international law. Credit, 3.
Three class hours. Mr. Braunthal.

170. International Organization.—International organization in the twentieth century, with emphasis upon the United Nations and regional organizations. Credit, 3.
Three class hours. Mr. Braunthal.

171. Ancient and Medieval Political Thought.—The development of political thought and its relation to cultural and institutional growth from the time of the Greeks to the end of the Middle Ages. Credit, 3.
Three class hours. Mr. Tinder.

172. Modern Political Thought.—The development of political thought and its relation to cultural and institutional growth from the rise of the modern state to the present. Credit, 3.
Three class hours. Mr. Tinder and Mr. Oppenheim.

176. Public Opinion in Politics.—Opinion and communication as aspects of the political process with emphasis upon communication through mass media. The relations between mass attitudes and communication and political institutions and the formation of public policy. Credit, 3.
Three class hours. Mr. Fenton.

178. Municipal Administration.—Administrative management in American municipalities based on descriptive literature, case materials and personal observation, with particular attention to Massachusetts cities and towns. Credit, 3.
Three class hours. Mr. O'Hare.

180. Municipal Corporations.—The creation and nature of municipal corporations and the legal problems encountered in the conduct of local government, with special reference to Massachusetts municipalities.
Three class hours. Credit, 3.
Mr. O'Hare.

183. Public Personnel Administration.—Theory, practice, and organization of the personnel functions in governmental administration, including recruitment, testing, classification, compensation, promotions, training, and employee relations. Credit, 3.
Three class hours. Mr. Mainzer.

184. Governmental Financial Administration.—Theory, practice and organization, including budgeting, revenues, debt operations, records, administration, purchasing, audits, and financial reporting. Credit, 3.
Three class hours. Mr. O'Hare.

191. Scope and Methods of Political Science.—Critical examination of the scope and unity of political science and the significant methodological positions and research techniques. Credit, 3.
Three class hours. Mr. Mainzer.

193. The Practice of American Politics.—A course in practical American politics, given by a prominent political leader under the University Distinguished Professorship in Public Affairs. Credit, 3.
Prerequisite, Government 25.

195, 196. Seminar.—Special problems in the field of government.
Three class hours. Credit, 3.
Prerequisite, permission of the Department. The Staff.

INTERDEPARTMENTAL COURSES

Social Science 160. Africa, South of the Sahara.—Recent political, economic, and social developments in the principal countries in Africa south of the Sahara.
Prerequisites, at least two courses in one or more of the following fields: Government, Economics, Sociology. Credit, 3.
Miss Carter.

Social Science 169. India and Southeast Asia.—Recent political, economic, and social developments in India and the countries of South and Southeast Asia.
Prerequisites, at least two semester courses in one or more of the following fields: Government, Economics, and Sociology. Credit, 3.
Mr. Driver.

HISTORY

Graduate Faculty: H. H. Quint, Head of Department, T. C. Caldwell, H. W. Cary, C. E. Cody, Jr., H. J. Gordon, Jr., L. S. Greenbaum, V. Ilardi, R. A. Potash, S. Williams.

In addition to the general requirements for the Master of Arts degree, candidates in History must fulfill the following departmental requirements:

A reading knowledge of one foreign language is required.

The requirement concerning a thesis may be fulfilled by one of the following options: (a) completion of a thesis, for ten credits, (b) completion of two seminar courses, with grades of at least B, (c) completion of a five credit thesis and one seminar.

A comprehensive written examination, in fields specified by the Department, is required of all candidates.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in History.—Directed research and writing for qualified students. Credit, 1-3.
Prerequisite, permission of instructor. THE STAFF.

201, 202. Literature of American History.—Interpretations of major themes as developed in the works of leading historians. The first course will treat the period through the Civil War; the second, 1865 to the present. Credit, 4 each semester
THE STAFF.

205. Era of the Confederation and the Constitution.—The formative years of the American Nation; the evolution of federal and state constitutions; basic political issues and conflicts; the pattern of economic and social development; and the origins of American foreign policy. Credit, 3.
MR. DAVIS.

207. Britain in the Nineteenth Century.—Central themes and topics. Emphasis on the history of thought in its relation to political, economic and social developments.
Three class hours. Credit, 3.
Prerequisite, permission of instructor. MR. CALDWELL.

208. Recent European History.—Basic developments in diplomatic, political, social and economic history since 1890 with particular emphasis upon organic growth and change. Credit, 3.
Prerequisite, permission of instructor. MR. GORDON.

209. Topics in Contemporary Latin American History.—A study of major movements since about 1930 with attention directed to the political, economic, social, and ideological forces contributing to change. Reading knowledge of Spanish or Portuguese is desirable but not required.
Three class hours. Credit, 3.
MR. POTASH.

210. Topics in Early Medieval History.—Continuity between ancient and medieval civilization.
Prerequisites, working knowledge of Latin and one modern language (German, French, Italian) or by special permission of instructor.
Three class hours. Credit, 3.
MR. WILLIAMS.

211. Topics in the Age of the Renaissance and Reformation.—A study of European culture between 1400 and 1600. A reading knowledge of a modern European language is generally required. Credit, 3.
Three class hours. MR. ILARDI.

212. Topics in the Age of the Enlightenment.—The movement of ideas in Atlantic Civilization during the 18th Century. Study of the mind and writings of representative European and American thinkers with emphasis upon politics, religion, science, literature and the arts. Credit, 3.
Three class hours. MR. GREENBAUM.

251. Seminar in American Diplomatic History.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor. MR. CARY.

253. Seminar in the Age of Jacksonian Democracy.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor.

256. Seminar in the Westward Movement of the United States.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor. MR. DEPILLIS AND MR. DAVIS.

257. Seminar in American History, 1880-1930.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor. MR. QUINT.

259. European Diplomacy Between the Wars.—Training in historical research and an introduction into the relationships among European nations in a critical period. Credit, 3.
Prerequisite, permission of instructor. MR. GORDON.

260. Modern English History.—Research on selected topics, 1890-1940.
Prerequisite, permission of instructor. Credit, 3.
MR. CALDWELL.

300. Thesis, Master's Degree. Credit, 5-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

The following courses are open to students who have fulfilled the prerequisites including History 5 or 6 or their equivalent. Graduate students will be expected to do such additional work as may be prescribed by the instructor.

151. Ancient History.—The development of civilization in the Ancient World. Credit, 3.
Three class hours. MR. WILLIAMS.

153, 154. History of Far Eastern Civilization.—The first semester will stress traditional and modern China, the second, Japan and Korea. Either semester may be elected independently. Credit, 3.
Three class hours. MR. CODY.

155, 156. A History of Russia.—A survey of the political, economic, social and intellectual development of Russia. The first semester will treat the Tsarist era, the second, the origins of Russian Marxism and the Soviet period. Either semester may be elected independently. Credit, 3.
Three class hours. THE STAFF.

157. Colonial Latin America.—A study of Spanish and Portuguese expansion into the New World, the Indian cultures, the development of political, social, and economic institutions, and the growth of the independence movement to 1810. Credit, 3.
Three class hours. MR. POTASH.

158. Argentina and Brazil Since Independence.—The emergence of the major South American states. Particular attention will be paid to the themes of political organization and economic change; and in the contemporary period to the growth of nationalism, and mass-based political movements. Credit, 3.
Three class hours. MR. POTASH.

HISTORY

159. The History of Mexico.—A study of Mexico from the end of the eighteenth century to the present. Emphasis will be given to political, economic, and social developments. Credit, 3.
Three class hours. Mr. Potash.

162. Medieval History.—European history from the collapse of Rome to the Renaissance. Credit, 3.
Three class hours. Mr. Williams.

163, 164. History of American Thought and Culture.—The basic strands of American thought and their reflection in American culture. First semester deals with the period before 1865. Either semester may be elected independently. Credit, 3.
Three class hours. Mr. Quint.

166. The History of Modern Germany.—The evolution and development of Germany since the accession of Frederick the Great with emphasis upon diplomatic, political, military and social-economic trends and problems. Credit, 3.
Three class hours. Mr. Gordon.

169. Europe, 1870-1918.—Internal developments of the principal countries; a detailed study of conditions and diplomacy which led to the World War; and military and diplomatic history of the war years.
Three class hours. Credit, 3.
Mr. van Steenberg.

170. Europe Since 1918.—Major developments in the internal and international affairs of the European states since World War I. Credit, 3.
Three class hours. Mr. Caldwell.

172. History of American Westward Expansion, 1763-1893.—Advance of settlement from the Appalachians to the Pacific and the influence of the frontier upon social, economic, and political conditions.
Three class hours. Credit, 3.
Mr. DePillis and Mr. Davis.

173, 174. The Age of the Renaissance and Reformation, 1300-1600.—A study of the changes in European thought and institutions during the development of Humanism and the Protestant and Catholic Reformations. Either semester may be elected independently. Credit, 3.
Three class hours. Mr. Ilardi.

175. Europe in the Enlightenment, 1685-1789.—Civilization of Western Europe in the eighteenth century, its social milieu, intellectual setting, institutional forces, religious tendencies, aesthetic contribuions, and the growth of revolutionary spirit. Credit, 3.
Three class hours. Mr. Greenbaum.

177. Modern Britain.—A study of selected topics on the political, social, and intellectual development of Britain in the nineteenth and twentieth centuries. Credit, 3.
Three class hours. Mr. Caldwell.

178. France Since 1789.—A study of selected, formative political crises from 1789 to the present, and their settings in the economic, social, and intellectual life of modern France. Credit, 3.
Three class hours. Mr. Gagnon.

179. New England to 1860.—A study of the colonial and early national periods, with emphasis upon the political, social and economic aspects of life in this region. Credit, 3.
Three class hours. Mr. Cary.

181. 182. Diplomatic History of the United States.—The development of American foreign relations, 1776 to the present. Either semester may be elected independently.
Three class hours. Credit, 3.
Mr. Cary.

183. The Progressive Age (1900-1920).—A study of the political response to the changing economic and social conditions in American life.
Three class hours. Credit, 3.
Mr. Quint.

184. Conservatism and Reform (1920-1945).—American political, economic and intellectual life between the two World Wars. Credit, 3.
Three class hours. Mr. Quint.

190. Historiography and Historical Method.—Training in location, appraisal, and handling of source materials. Critical evaluation of technique and ideas of representative historians from Thucydides to Toynbee. Credit, 3.
Three class hours. Mr. Greenbaum, Mr. Gagnon and Mr. Gordon.

HOME ECONOMICS

Graduate Faculty: M. A. Niederpruem, Dean, G. M. Cook, M. E. Lojkin, A. W. Wertz.

Graduate work is offered primarily in the fields of Food and Nutrition and Home Economics Education. Those applying for graduate work in Food and Nutrition should have an undergraduate major in Food and Nutrition, or its equivalent, with substantial offerings in Biochemistry and Physiology.

Students applying for graduate work in Home Economics Education should have a Bachelor's degree in Home Economics with adequate course work in Home Economics and supporting disciplines to qualify for graduate courses in the following areas: Food and Nutrition; Textiles, Clothing and Related Arts; Management and Family Economics. Students' background should include some courses in Education and Practice Teaching. The candidates for this degree are required to take at least 9 credits in one subject matter area of Home Economics, including a problem and a seminar. Graduate students interested in Child Development and Family Life may wish to avail themselves of the privilege of affiliating at Merrill-Palmer in Detroit. Such students must take at least 15 credits in residence at the University.

COURSES OPEN TO GRADUATE STUDENTS ONLY

200. Special Problem in one of the following fields: Food and Nutrition; Textiles, Clothing and Related Arts; Home Economics Education; Management and Family Economics and Human Development. Credit, 3-6.

300. Thesis, Master's Degree.—Individual research in the field of Nutrition. Credit, 10.

FOOD AND NUTRITION (FN)
COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

121. Developments in Nutrition Education.—Interpretation of changing and new concepts and of technical material; place of nutrition in schools and public health programs.
Three class hours. Credit, 3.
Prerequisites, FN 52 or 3 credits in physiological sciences. MRS. COOK.

203. Advanced Nutrition—Metabolism of the Major Foodstuffs.—Energy metabolism and the metabolism of carbohydrates, fats, proteins, and related substances, their role in human nutrition, and physiological effects of dietary inadequacies. Special reports from current literature supplementing class discussion. Credit, 3.
Prerequisites, Biochemistry and/or Physiology. MRS. WERTZ.

204. Advanced Nutrition—Vitamins and Minerals.—Vitamins and minerals in metabolism, their specific functions in the body and results of mild and severe deficiencies. Credit, 3.
Prerequisites, Biochemistry and/or Physiology. MRS. WERTZ.

207. Problems in Nutrition.—Qualified students may work on a problem of special interest to them in the fields of vitamin and mineral metabolism, basal metabolism, dietary survey techniques, etc. Credit, 3.
Prerequisite, FN 203, or 204 or equivalent. MRS. WERTZ.

210. Nutrition Seminar.—Readings, discussions and preparation of bibliographies on nutrition problems of current interest. Credit, 1-3.
THE STAFF.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

152. Advanced Nutrition and Dietetics.—Absorption, utilization and interrelationship of food nutrients. Evaluation of factors that influence nutrient requirements. Critique of methods of determining nutrient requirements.
Two class hours, one 2-hour laboratory. Credit, 3.
Prerequisites, FN 27, 51, Chemistry 79, Zoology 35. MRS. COOK.

173. Nutrition During Growth and Development.—Nutrition as it affects physical growth and development from prenatal through adolescence. Criteria for judging and studies of nutritional status of children. Opportunity for laboratory work in the Nursery School.
Three class hours. Credit, 3.
Prerequisites, FN 27 or 52. MRS. COOK.

189. Nutrition in Disease.—Physiological basis for the use of therapeutic diets in certain diseases. Current medical and nutrition literature used.
Three class hours. Credit, 3.
Prerequisites, FN 52, Chemistry 79, Zoology 35 or equivalent. MRS. COOK.

191. Institutional Administration.—Principles of organization, personnel management, sanitation, food service, planning and equipment selection. Field trips in the area.
Two class hours, one 4-hour laboratory or field trip. Credit, 4.
Prerequisites, FN 51 or 56. MRS. MCCULLOUGH.

192. Quantity Food Preparation.—Experience in use of large equipment and application of principles of quantity food preparation, service and cost control. University Dining Hall and Amherst School Lunch Program utilized.
Two class hours, one 4-hour laboratory. Credit, 4.
Prerequisites, FN 51 or Food Management 33, FN 30. Mrs. McCullough.

194. Experimental Foods.—Investigation of experimental techniques and advanced knowledge related to the chemistry of food preparation. Original research projects included. For those interested in dietetics, food and nutrition in business or non-majors interested in foods.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisites, FN 30 and 51; and/or Chemistry 33 or Chemistry 51 and 52 or permission of instructor. Miss D. Davis.

TEXTILES, CLOTHING AND RELATED ARTS (TCRA)
COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

210. Seminar.—Readings, reports and discussions on the current literature in the area of Textiles, Clothing and Related Arts. Credit, 1-3.
The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

153. Advanced Clothing Construction.—Principles and practices of clothing construction. Emphasis on study of patterns and problems of fitting. Opportunities for students to create original designs.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisite, TCRA 28. Mrs. Jarvesoo.

165. Apparel Selection and Design.—A comprehensive study of the development of individual expression and the attainment of satisfactions in men's, women's and children's apparel through an understanding and adaptation of basic knowledge of selection and design.
Three class hours. Credit, 3.
Prerequisites, TCRA 23, or permission of instructor, Psychology 1 or Sociology 25. Miss Hawes

176. History of Decorative Arts.—A study of style periods in historic context—their aesthetic contributions. Emphasis on developments in western dress, furniture and furnishings. Illustrated lectures. Study tours.
Three class hours. Credit, 3.
Prerequisites, TCRA 23, or by permission of instructor. Mrs. Jarvesoo.

186. Textiles II.—Concentrated study and evaluation of recent scientific and technical developments in fibers and finishes affecting appearance, performance, care and cost.
Three class hours. Credit, 3.
Prerequisite, TCRA 24. Miss Hawes.

HOME ECONOMICS EDUCATION (HEEd)
COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

210. Seminar.—Readings, reports and discussions on the current literature in the area of Home Economics Education. Credit, 1-3.
THE STAFF.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

181. Adult Education in Home Economics.—Organization of material, selection, use and evaluation of teaching techniques suited to group work with adolescents and adults. Credit toward meeting state standards for teachers and A.D.A. requirement.
Two class hours, one 2-hour laboratory. Credit, 3.
Prerequisite, minimum 6 credits in major area. MRS. SULLIVAN.

182. Curriculum in Home Economics.—Organization, scope and sequence of learning experiences in home economics education at secondary level. Philosophy and content of curriculum, development of resource units.
Two class hours, one 2-hour laboratory. Credit, 3.
Prerequisites, Psychology 56 and 66, Education 51. MRS. SULLIVAN.

MANAGEMENT AND FAMILY ECONOMICS (MFE)
COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

130. Home Management for Today's Families.—Emphasis on management principles involved in family economics, work simplification, and decision making in the home. For teachers, extension workers and others who work in an advisory capacity with families. Credit, 3.
Prerequisites, B.S. degree in Home Economics, MFE 175 and 177, or equivalent, and professional experience. MISS MERRIAM AND THE STAFF.

210. Seminar.—Readings, reports and discussions on the current literature in the area of family economics and home management. Credit, 1-3.
THE STAFF.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

175. Personal and Family Economics.—Analysis of financial problems and alternatives available to individuals and families under changing conditions. Exploring aspects of financial institutions affecting people in our economic society.
Three class hours. Credit, 3.
Prerequisite, Economics 25 or by special permission of instructor.
MISS MERRIAM.

HUMAN DEVELOPMENT (HD)
COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

210. Seminar.—Readings, reports and discussions on the current literature in the area of Human Development. Credit, 1-3.
THE STAFF.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

170. Child Development.—The study of the child from the developmental point of view. Planned observation and participation in the nursery school.
Three class hours, one 1-hour laboratory period. Credit, 3.
Prerequisites, Sociology 25, Psychology 1. THE STAFF.

183. Nursery School Management.—Principles and methods of nursery school education. Directed experience in teaching and curriculum planning for three- and four-year-old children. Field trips.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisites, HD 70 or Psychology 65. MISS WEAVER.

184. Nursery School Management.—Continuation of 183.
Two class hours, one 3-hour laboratory. Credit, 3.
Prerequisite, HD 83 or permission of instructor. MISS WEAVER.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Home Economics)

HOME ECONOMICS EDUCATION (HEEd)

163. Art Activity in Recreation.—Stresses creative growth of the individual. Adapted for those working in schools, playgrounds, camps, in recreational leadership and occupational therapy.
Two class hours, one 2-hour laboratory. Credit, 3.
Prerequisite, Psychology 1. MRS. SULLIVAN.

HORTICULTURE

Graduate Faculty: G. B. SNYDER, Head of Department, A. W. BOICOURT, J. R. HAVIS, W. H. LACHMAN, F. W. SOUTHWICK, W. D. WEEKS.

All students who major in Horticulture are required to present a thesis as a part of their major requirements.

The graduate program permits specialization in Floriculture, Olericulture or Pomology.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201, 202. Horticultural Literature.—A critical review of scientific literature in the specialization area of Floriculture, Olericulture, or Pomology. Topics selected according to the area of specialization and needs of the individual student. Credit, 2 each semester.
Maximum credit, 4.
THE STAFF.

203. Advanced Systematic Floriculture.—Taxonomic study of floricultural plants. Credit, 3.
Prerequisites, Horticulture 154 and Botany 159. Mr. Boicourt.

207. Advanced Pomology I.—The more important research dealing with pollination, fruit set and thinning, preharvest drop, biennial bearing, and the physiology of fruit during storage. Credit, 3.
Prerequisite, Horticulture 51 or equivalent. Mr. Southwick.

208. Advanced Pomology II.—The more important research on stock and scion interrelationships, water and temperature influences, and mineral nutrition of fruit plants. Credit, 3.
Prerequisite, Horticulture 51 or equivalent. Mr. Weeks.

265. Systematic Olericulture.—An intensive study of the history, ontogeny, nomenclature, classification, identification, and structure of the various kinds, varieties, and strains of vegetables.
Given in alternate years. Credit, 4.
Mr. Maynard.

276. Advanced Vegetable Plant Improvement.—Hybridization and selection of specific vegetable crops; heterosis and its implications in vegetable breeding; also sterility and its place in the seed production of F_1 hybrids. Credit, 3.
Prerequisites, Horticulture 162, Zoology 153 or equivalent.
Mr. Lachman.

291, 292. Seminar.—Each student will present papers on assigned topics relating to his area of specialization. Required of all graduate students majoring in Horticulture. Credit, 1 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

162. Plant Breeding Methods.—An advanced study of genetic topics peculiar to plants, together with the methods and problems of the plant breeder. Credit, 3.
Prerequisite, Zoology 153 or equivalent. Mr. Lachman.

165. Principles of Olericulture.—A study of the physiological and nutritional factors influencing the growth and culture of vegetable plants. Credit, 3.
Mr. Maynard.

173. Produce Marketing Practices.—Methods of preparing produce for market, post-harvest handling, quality control, precooling, packing house facilities, commercial grades, packs, packages and inspection services. Credit, 3.
Mr. Snyder.

174. Merchandising Perishables.—Merchandising produce through wholesale and retail channels, emphasizing prepackaging, types of wholesale and retail outlets and operators, methods of sale, regulations, brands and advertising. Credit, 3.
Mr. Snyder.

COURSE FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Horticulture)

154. Herbaceous Plants. Credit, 3.
Mr. Boicourt.

LANDSCAPE ARCHITECTURE

Graduate Faculty: R. H. Otto, Head of Department, T. S. Bacon, Jr., P. N. Procopio.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Individual study by the B.L.A. candidate in lieu of a thesis; or exploratory work preliminary to the thesis by the M.L.A. candidate. Credit, 3.
The Staff.

290. Theory.—Special studies in the history and theory of landscape architecture and planning. Credit, 3.
Mr. Hamilton or Mr. Bacon.

291. Design.—Individual problems in any or all branches of public and private work. Credit, 3.
Mr. Otto.

292. Construction.—Road alignment, computations and advanced landscape construction. Credit, 3.
Mr. Procopio.

293. Presentation.—Studies in drafting, pen and crayon, rendering, water coloring, etc. Credit, 3.
Mr. Kent.

294. Practice.—Professional field work under supervision, conducted upon going projects as opportunity offers. Credit, 3.
The Staff.

297. Architecture.—Selected problems. Credit, 3.
Mr. Kantianis.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

167. Architecture.—Architectural development, including styles and forms in architecture, especially as affected by materials and methods of construction. Credit, 3.
Mr. Kantianis.

168. Architectural Design.—The relations between exterior and interior spaces and structures as a primary element in design and construction. A series of problems integrating theory, design analysis, and graphics. Credit, 4.
Mr. Kantianis.

171. Planting Design.—The utilization of plant materials in combination as applied to the many conditions and demands of landscape work. Credit, 3.
Mr. Caven.

173, 174. City Planning.—The historical and legal aspects of land use and regional development, and a critical examination of planning techniques used in guiding the physical growth of communities. Either semester may be elected independently. Credit, 3 each semester.
Mr. Bacon.

175, 176. Projects in Planning.—An application of the principles of modern civic development through a series of problems on the design of various types of urban land areas. Credit, 3 each semester.
Mr. Bacon.

177, 178. Urban Problems.—Housing, industrial location and development, decentralization, arterial systems, civic and metropolitan design, and regional planning.
Open to non-majors. Credit, 3 each semester.
Prerequisites, L.A. 173, 174, or permission of instructor. Mr. Bacon.

181, 182. Advanced Design.—Exchange problems plus specialized landscape details and a summary of design. Credit, 4 each semester.
Mr. Procopio.

184. Presentation.—Preparation and rendering of landscape and architectural plans, elevations, perspectives, etc. Credit, 2.
Mr. Kent.

196. Professional Practice.—Seminar on the methods and procedures of the professional office. Credit, 1.
Mr. Otto.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Landscape Architecture)

153. Applied Design.—A series of problems in the design of small home grounds and larger private properties. Credit, 4.
Mr. Kent.

154. Intermediate Design.—Special problems in site planning for semi-public and public works, institution grounds, etc. Credit, 4.
Mr. Kent.

155. Construction Details.—A series of problems in architectural garden features as walks, steps, walls, fences, pools and small structures. Credit, 4.
Mr. Procopio.

FOR THE DEGREE OF BACHELOR OF LANDSCAPE ARCHITECTURE

To receive this professional bachelor's degree, each candidate will be required:

1. To have received the degree of Bachelor of Science or Bachelor of Arts from a recognized institution.
2. To have completed as a prerequisite 24 semester credits in landscape architecture, substantially equivalent to the technical courses now required in the undergraduate major in landscape architecture at this university.

3. In addition, to have completed in residence at this institution, 30 credits in landscape architecture and closely related subjects prescribed by the department. (See Fifth Year Program below.)
4. To have received the unanimous approval of the faculty of the department and the vote of approval of the faculty of the Graduate School.

FIFTH YEAR PROGRAM

The regular program of studies for the Fifth Year, subject to minor changes dependent upon courses taken previously, is as follows:

First Semester

201. General Design.—Class A Exchange problems and advanced local projects. Credit, 3.
Mr. Otto.

203. Ecology and Physiography.—Plant associations as related to ground forms and conditions. Credit, 3.
Mr. Mosher.

205. Architecture.—Studies in principles and problems of architectural design. Credit, 3.
Mr. Kantianis.

207. Contracts, Specifications, Estimating Costs.—Preparation of supporting data for proposed plans. Credit, 3.
Mr. Hamilton.

209. Landscape Sketching.—Graphic expression of suitable subjects in various media. Credit, 3.
Mr. Kent.

Second Semester

202. General Design.—Continuation of 201. Credit, 3.
Mr. Otto.

204. Landscape Operations.—Supervision of local landscape projects. Credit, 3.
The Staff.

206. Architecture.—Studies in principles and problems of architectural design. Credit, 3.
Mr. Kantianis.

210. Architectural Sketching.—Graphic expression of suitable subjects in various media. Credit, 3.
Mr. Kent.

Elective: Suitable subject assigned.

MATHEMATICS

Graduate Faculty: A. E. Andersen, Head of Department, R. R. Archer, A. G. Azpeitia, H. F. Cullen, D. J. Dickinson, R. W. Wagner.

Special Departmental Entrance Requirements:

Candidates for admission who plan to major in this department must have completed at least eighteen semester credit hours in undergraduate mathematics beyond the content of Mathematics 29 and 30 (Differential

and Integral Calculus), and also an undergraduate course equivalent to Physics 3 and 4 (Introductory).

A one-year course in Modern Algebra and a one-year course in advanced, theoretical calculus would be desirable. Both of these courses are necessary, before entrance to graduate school, if a student is to complete the work of a Master's degree in one year.

Special Degree Requirements:

The following courses, or equivalent courses taken elsewhere are required for a Master's degree: 53, 54 (no graduate credit for Mathematics majors), 185, 186, 188, 241, 201; either 221 or 227; one of the four courses 202, 222, 228, 242.

A total of 30 graduate credit-hours is required of which not more than six credit-hours may be taken in other departments. The choice of courses taken in other departments is subject to the approval of this department.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Topics Course.—Topics may be chosen from the fields of algebra, geometry, theory of functions, topology, and applied mathematics.
Credit, 1, 2, or 3.
Prerequisite, permission of instructor. THE STAFF.

201, 202. Introduction to Modern Algebra.—Axiomatic foundation of algebra groups, rings, fields and vector spaces; linear transformations and matrices.
Three class hours. Credit, 3 each semester.
Prerequisite, Mathematics 154. THE STAFF.

221, 222. Theory of Functions of a Real Variable.—The real number system, limits, continuity and differentiability of functions of one and two real variables, theories of integration, sequences of functions.
Three class hours. Credit, 3 each semester.
Prerequisite, Mathematics 241. THE STAFF.

227. Theory of Functions of a Complex Variable.—Holomorphic functions, power series and complex integration, singularities, series and infinite products of holomorphic functions, entire and meromorphic functions.
Three class hours. Credit, 3.
Prerequisites, Math 241 and 186. THE STAFF.

228. Theory of Functions of a Complex Variable.—Topics selected from: Conformal mappings, Riemann surfaces, special functions, Laplace and Fourier series and trasnforms, differential equations and boundary value problems. Physical applications.
Three class hours. Credit, 3.
Prerequisite, Math 227. THE STAFF.

241. Topology I.—Point Set Topology.—Set theory; Topological, Hausdorff and metric spaces; homeomorphisms; connectivity and compactness.
Prerequisites, Math 185 and 188. Credit, 3.
THE STAFF.

242. Topology II.—Combinatorial Topology.—Simplexes, complexes, Jordan's theorem, Homology and homotopy. Credit, 3.
Prerequisite, Mathematics 241. THE STAFF.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. Projective Geometry.—A study, from both the synthetic and analytic viewpoints, of properties invariant under projection, with emphasis on the real plane. Equivalence of Desarguesian and coordinate projective geometries.
Three class hours. Credit, 3.
Prerequisite, Math 153. THE STAFF.

162. Higher Geometry.—A study along the lines of Klein's *Erlanger Programm* of various geometries and their groups of transformations, emphasizing Projective, Affine, and Euclidean.
Three class hours. Credit, 3.
Prerequisites, Math 154, and Math 161 or permission of instructor.
THE STAFF.

163. Probability.—A postulational study of probability including counting methods, random variables, moments, and the binomial, Poisson, and normal distributions.
Three class hours. Credit, 3.
Prerequisite, Math 29, previously or concurrently. THE STAFF.

164. Mathematical Statistics.—Estimation of parameters, testing hypotheses, use of the chi-squared, t-, F-, and other distributions.
Three class hours. Credit, 3.
Prerequisite, Math 163. THE STAFF.

168. Linear Algebra.—Row equivalence. Linear transformations and matrices. Similarity Invariant subspaces, canonical forms. Inner product spaces, linear functionals, the spectral theorem. Bilinear forms.
Three class hours. Credit, 3.
Prerequisite, Math 154 or 152. THE STAFF.

169. Theory of Groups and Group Representations.— Axioms systems, Lagrange theorem, generators, relations. Conjugate classes, normal subgroups, quotient groups. Sylow theorems. Abelian groups. Unitary and irreducible representations. Characters, orthogonality relations.
Three class hours. Credit, 3.
Prerequisite, Math 168. THE STAFF.

174. Theory of Numbers.—Euclid's Algorism, theory of prime numbers, aliquot parts, congruences, further topics in number theory.
Three class hours. Credit, 3.
Prerequisite, Math 153. THE STAFF.

183. Numerical Analysis.—Approximation and error evaluation; finite differences; approximation by polynomials using finite difference methods and minimal criteria; special reference to sets of orthogonal polynomials.
Three class hours. Credit, 3.
Prerequisites, Math 32 or 191; Computer Science 21 (may be taken concurrently). THE STAFF.

184. Numerical Analysis.—Evaluation of definite integrals; solution of differential equations, polynomial equations, other conditional equations, and systems of linear equations with related matrix manipulations.
Three class hours. Credit, 3.
Prerequisites, Math 183 and 192 or 32. THE STAFF.

185. Introductory Modern Analysis.—Real and complex numbers. Basic topology of the real number system. Limit concept and continuity. Differentiation. Partial differentiation.
Three class hours. Credit, 3.
Prerequisite, Math 191. THE STAFF.

186. Introductory Modern Analysis.—Bounded variation. Riemann-Stieltjes integration. Multiple integrals. Line integrals. Infinite series. Sequences of functions. Improper Riemann-Stieltjes integrals.
Three class hours. Credit, 3.
Prerequisite, Math 185. THE STAFF.

188. Sets and Ordered Structures.—Basic properties of sets. Ordered sets. Complete ordered sets. Well-ordered sets. Cardinal and ordinal numbers. Axiom of choice, well-ordering theorem, Zorn's Lemma and other forms of the axiom of choice. Cardinal arithmetic.
Three class hours. Credit, 3.
Prerequisite, Math 185 or permission. THE STAFF.

193. Fourier Series and Orthogonal Functions.—Solutions of boundary value problems by Fourier series, Bessel functions, Legendre polynomials; convergence of representations by orthogonal functions.
Three class hours. Credit, 3.
Prerequisite, Math 192 or 32. THE STAFF.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Mathematics)

152. Introduction to Vector Spaces and Groups.—The last two-thirds of Mathematics 54. Finite dimensional vector spaces, linear transformations, elementary theory of matrices and determinants.
Three class hours for the last two-thirds of a semester. Credit, 2.
Prerequisite, Math 4 or permission of the department head. THE STAFF.

153. Introduction to Modern Algebra.—Basic concepts, groups, rings, the real and complex fields.
Three class hours. Credit, 3.
Prerequisites, Math 30 or 31, or permission. THE STAFF.

154. Continuation of Mathematics 153.—Polynomials, cyclic groups, finite dimensional vector spaces, linear transformations, elementary theory of matricies and determinants.
Three class hours. Credit, 3.
Prerequisite, Math 153. THE STAFF.

155. Mathematics of Finance.—The mathematical principles of simple and compound interest, annuities, depreciation, valuation of bonds, and insurance. May not be counted for Mathematics major credit.
Three class hours. Credit, 3.
Prerequisite, Math 1, 5 or 7. THE STAFF.

157. Linear Programming and Theory of Games.—Topics include sets, probability, vectors, matrices, and an introduction to linear programming and theory of games.
Three class hours. Credit, 3.
Prerequisite, Math 2 or 4. THE STAFF.

171. Vector Analysis.—The Algebra and Calculus of vectors. Applications to Physics and other fields will be considered.
Three class hours. Credit, 3.
Prerequisite, Physics 4 or 6; corequisite, Math 31 or 191. The Staff.

175. Advanced Engineering Mathematics.—Series solution of differential equations, functions of several variables, partial differential equations, numerical analysis and the Laplace transform. Not available for majors in Mathematics.
Three class hours. Credit, 3.
Prerequisite, Math 192 or 32. The Staff.

176. Advanced Engineering Mathematics.—Vectors and vector spaces, vector field theory, complex analysis. Not available for majors in Mathematics.
Three class hours. Credit, 3.
Prerequisite, Math 192 or 32. The Staff.

181. Complex Analysis.—The Algebra of complex numbers, the elementary functions and their mappings, differentiation, integration, Taylors series, and residues.
Three class hours. Credit, 3.
Prerequisite, Math 192 or 32. The Staff.

191. Intermediate Calculus.—Series, expansion of functions, partial differentiation, and multiple integrals.
Three class hours. Credit, 3.
Prerequisite, Math 30. The Staff.

192. Differential Equations.
Three class hours. Credit, 3.
Prerequisite, Math 191. The Staff.

MECHANICAL AND INDUSTRIAL ENGINEERING

Mechanical Engineering

Graduate Faculty: W. H. Weaver, Head of Department, M. E. Bates, R. W. Day, J. H. Dittfach, C. A. Keyser, J. M. O'Byrne, E. J. Rising, D. Sobala, J. D. Swenson.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Mechanical Engineering.—Special investigational or research problems, the scope to be varied to meet specific conditions. Credit, 1-6.
Prerequisite, as required by the problem. The Staff.

201. Advanced Thermodynamics.—A detailed treatment of the first and second laws and a selection of advanced topics to fit individual needs.
Prerequisite, M.E. 87. Credit, 3.
The Staff.

211. Theory of Power Machines.—Advanced thermodynamic study applied to heat power equipment such as gasoline and Diesel engines, steam and gas turbines, rotary and reciprocating compressors, jet propulsion, and rockets. Credit, 3.
Prerequisites, M.E. 177, 184. The Staff.

221. Advanced Heat Transfer.—Advanced topics in heat transfer.
Prerequisite, M.E. 182. Credit, 3.
THE STAFF.

241. Advanced Dynamics.—Vibration and stability of systems with many degrees of freedom, normal modes and frequencies; approximate methods. Nonlinear systems, self excited vibrations. Gyroscopic effects in mechanical systems. Selected topics with application to problems in engineering. Credit, 3.
Prerequisite, M.E. 185. MR. WHITE AND MR. SOBALA.

251. Advanced Topics in Machine Design.—Application of advanced theories to Machine Design and Kinematics. A variety of topics and considerable creative work are included. Credit, 3.
Prerequisite, M.E. 183. MR. BATES.

300. Thesis, Master's Degree. Credit, 3-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

150. Fundamentals of Metallurgy.—Physical metallurgy involving crystal structure, solid solutions, diffusion in the solid state, freezing of metals, hardening of metals, annealing, and equilibrium diagrams. Fundamentals are applied to the study of the iron-iron carbide diagram, the S-curve, heat treatment of steel and the properties and uses of the other principal engineering metals. Laboratory work stresses metallographic technique.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, M.E. 35 or Chemistry 166. THE STAFF.

168. Kinematics.—Principles of mechanism, including velocity and acceleration diagrams, instant centers, gear teeth and gear trains, cams, and various speed transmissions.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisites, M.E. 1 and C.E. 52. THE STAFF.

174. Basic Aerodynamics.—An introduction to the basic concepts of applied aerodynamics, for the student who has no previous background in the subject. Topics include properties of air, ideal fluid flow, airfoils and their properties, aircraft performance and stability.
Three class hours. Credit, 3.
Prerequisite, C.E. 76. THE STAFF.

175. Steam Power Plants.—A study of steam power plants, including boilers, stokers, fuels, combustion, steam generation, prime movers, auxiliary equipment, and problems involved in design and operation.
Three class hours. Credit, 3.
Prerequisite, M.E. 64. MR. SWENSON.

176. Refrigeration and Air Conditioning.—The fundamental principles of thermodynamics as applied to refrigeration and air conditioning. Application of refrigeration to industrial processes and the control of temperature, humidity and motion of air in buildings.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, M.E. 64. MR. SWENSON.

177. Internal Combustion Engines.—The thermodynamic and performance aspects of reciprocating gasoline and Diesel engines, steady flow gas turbines and turbo-jet engines, and rockets are major topics.
Three class hours. Credit, 3.
Prerequisite, M.E. 64, Mr. Dittfach.

182. Heat Transfer.—Methods of evaluating heat transfer rates and predicting operating temperatures. Heat transfer by conduction, radiation, and convection. Topics include one- and two-dimensional conduction, heat flow, transient heat flow, fins, numerical and graphical solutions, free and forced convection and radiation.
Three class hours. Credit, 3.
Prerequisites, M.E. 64 and Mathematics 32 or 192. Mr. O'Byrne.

183. Machine Design.—Principles involved in the design of various machine parts. Related topics included such as economy of manufacture, safety, styling, invention, and creativity.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisites, C.E. 53 and M.E. 168. Mr. Bates and Mr. Patterson.

184. Basic Engineering Analysis.—The application of mathematical methods to the solution of mechanical engineering problems in such fields as vibrations, elasticity, fluid mechanics, and dynamics. The analysis of the problems and the derivation of the governing equations.
Three class hours. Credit, 3.
Prerequisites, M.E. 185, Mathematics 32 or 192. The Staff.

185. Dynamics of Machinery.—Elements of vibration theory, vibration isolation, vibration analysis of equivalent masses and shaft systems. Vibration absorbers of dynamic balancing. Students may schedule the course without the laboratory (3 cr.) or with the laboratory (4 cr.).
Three class hours; one 3-hour laboratory period. Credit, 3-4.
Prerequisites, C.E. 52 and M.E. 168. Mr. Sobala.

186. Advanced Machine Design.—A continuation of Course 183. Additional elementary parts are analyzed, and some complete machines are studied. Considerable emphasis on invention and creativity.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, M.E. 183. Mr. Bates and Mr. Patterson.

187. Engineering Thermodynamics III.—Topics investigated include combustion and gas dynamics with emphasis on one dimensional flow with normal and oblique shock.
Three class hours. Credit, 3.
Prerequisites, Math 32 and M.E. 64. The Staff.

190. Advanced Metallurgy.— Advanced topics in metallurgy including the structure of metals and recent metallurgical developments.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, M.E. 150. The Staff.

197. Experimental Mechanical Engineering. Credit, 3.
Prerequisite, permission of instructor. The Staff.

Industrial Engineering

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Industrial Engineering.—Special investigational or research problems in industrial engineering, the scope to be varied to meet specific conditions. Credit, 1-6.
Prerequisite as required by the problem. THE STAFF.

253. Methods of Measurement of Human Work.—A critical study of the assumptions in measuring human effort in industry including the problems present in rating, predetermined data systems, the use of the high speed camera in securing data.
Three class hours. Credit, 3.
Prerequisite, I.E. 53 and 72 or comparable courses. THE STAFF.

254. Advanced Topics in Engineering Economy.—A more intensive study of the basic subject field of engineering economy as stated in I.E. 54.
Three class hours. Credit, 3.
Prerequisite, I.E. 54 or a similar basic course in engineering economy. THE STAFF.

256. Advanced Topics in Data Processing.—Probability theory and information theory, components and operation of analog and digital computers, the analysis of large scale data processing systems as applied to the functioning of industrial control systems.
Three class hours. Credit, 3.
Prerequisite, I.E. 56 or a similar basic course in data processing principles and applications. THE STAFF.

277. Manufacturing Control.—A quantitative approach to decision making in production management. Incremental analysis, linear programming, waiting line theory, statistics as applied to problems of economic quantity planning, production programming, statistical control and equipment purchase.
Three class hours. Credit, 3.
Prerequisite, a basic knowledge of statistics and the principles of operations research. THE STAFF.

279. Quantitative Methods in Industrial Engineering.—The application of mathematical concepts and the principles of operations research and probability to various Industrial Engineering problems. The theoretical background will be presented, demonstrated by example and applied by exercises and case problems.
Three class hours. Credit, 3.
Prerequisite, a basic knowledge of statistics and the principles of operations research. THE STAFF.

300. Thesis, Master's Degree. Credit, 3-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

153. Methods and Standards Engineering.—The principles involved in the simplification of the work pattern and the design of the work place, and in the establishment of production standards for industrial engineering students.

Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Statistics 177, previously or concurrently. THE STAFF.

154. Engineering Economy.—A study of the bases for comparison of alternatives in engineering projects, break-even and minimum cost points, evaluation of proposals for new activities, economy of operations, the evaluation of public activities, the output and life of typical items of engineering and industrial equipment, manufacturing lot sizes, economic purchase quantities, the selection and replacement of structures and machines.
Three class hours. Credit, 3.
Prequisites, Economics 25, Mathematics 6, and Industrial Engineering 179. THE STAFF.

156. Analysis of Data Processing Systems.—Principles and applications of data processing and electronic computer systems for use by Industrial Engineers as a management tool for control and decision making.
Three class hours. Credit, 3.
Prerequisite, approval of instructor. THE STAFF.

172. Principles of Engineering Statistics.—A study of statistical principles as applied to engineering problems including: analysis of variances, design of experiments, sampling plans, statistical quality control.
Three class hours. Credit, 3.
Prerequisite, a basic course in statistics comparable to Statistics 77.
THE STAFF.

175. Job Evaluation.—The principles used to determine an evaluation of all occupations in order to establish an equitable rating between them, to establish sound wage and salary policies.
Two class hours. Credit, 2
Prerequisite, I.E. 51. THE STAFF.

176. Time Study.—The principles involved in the establishment of production standards and their application in the management functions of cost accounting, estimating, production control, incentives, budgetary control. Credit, 3.
Prerequisites, I.E. 175, 182 concurrently except for Business Administration majors. THE STAFF.

177. Factory Planning and Lay-out.—The principles applying to the determination and development of the physical relationship between plant equipment and operators working toward the highest degree of economy and effectiveness in operation.
One class hour; one 3-hour laboratory period. Credit, 2.
Prerequisites, M.E. 2 and I.E. 51. THE STAFF.

178. Production Control.—The principles used to regulate production activities in keeping with the manufacturing plan.
Three class hours. Credit, 3.
Prerequisites, I.E. 51. THE STAFF.

179. Industrial Engineering Problems.—The principles of statistics, theory of probability, theory of games, principles of linear programming applied to solutions of problems in inventory control, costing, production control, quality control, production standards, work measurement, delay allowances.
Three class hours. Credit, 3.
Prerequisites, Mathematics 57, Statistics 177, and I.E. 53. THE STAFF.

180. Plant Budgetary Control.—The principles used to predetermine expenses for the factors of production and the comparison of results with the estimates to determine and deal with the causes of expense variations as applied by the operating organization in the industrial plant.
Three class hours. Credit, 3.
Prerequisites, I.E. 51. THE STAFF.

182. Work Simplification.—The principles involved in the simplification of means of doing work and in the application and use of these principles.
One class hour; one 3-hour laboratory period. Credit, 2.
Prerequisites, M.E. 168 and I.E. 176 concurrently. THE STAFF.

MICROBIOLOGY

Graduate Faculty: C. D. Cox, Head of Department, W. LITSKY, M. MANDEL.

Registration by permission of the Department. Prerequisite courses required of graduate students in microbiology are general chemistry, qualitative and quantitative analysis, organic chemistry, physics, and specified courses in undergraduate microbiology. Students who have not taken these courses as undergraduates will be required to fulfill these requirements here without graduate credit.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Research experience for students who do not write a thesis. Credit, 3-6.
THE STAFF.

201. History of Microbiology.—The development of microbiology from antiquity to the present time. Credit, 2.
THE STAFF.

202. Advanced Microbial Physiology.—Lectures, literature reviews, and laboratory exercises in microbial nutrition, metabolism, and growth.
Prerequisites, Microbiology 51, 194, and Chemistry 179 or 193. Credit, 3-5.
MR. MANDEL.

203. Microbial Cytology.—Lectures, literature reviews, and laboratory demonstrations, designed to give the student a comprehensive survey of the structure of microbial cells and the functions of their components.
Prerequisites, College Biology and Microbiology 31. Credit, 3-5.
THE STAFF.

204. Research Project.—Investigational work on microbiological problems not related to thesis. Limited to 3 credits per semester. For Ph.D. candidates only. Credit, 1-6.
THE STAFF.

205. Advanced Immunology.—Advanced theories and laboratory procedures basic to immunology and serology.
Prerequisite, Microbiology 185. Credit, 3-6.
THE STAFF.

206. Microbiological Fermentations.—Theories, methods, and processes by which various chemicals and biological materials are produced industrially through the action of microorganisms. The laboratory experiments consider the microorganisms involved, procedures used, and the chemistry of the fermentation reactions. Credit, 3.
Prerequisites, Microbiology 51 and Chemistry 179 or 193.
Mr. Czarnecki.

207. Adanced Virology.—A comprehensive study of viruses, including laboratory work covering methods for cultivation and identification.
Prerequisites, Microbiology 86 and permission of instructor. Credit, 3-5.
The Staff.

208. Seminar.—Reports on current literature and special topics.
Credit, 1 each semester. Maximum credit, 6.
The Staff.

213. Antibiotics.—The historical background and theory of action of antibiotics are correlated with practical laboratory procedures used in the study of their isolation, methods of assay, and effects on morphology and survival of bacteria. Credit, 3.
Prerequisites, Microbiology 51 and 52. Mr. Czarnecki.

214. Microbial Genetics.—Inheritance and variation in microbes, and mechanisms of recombination, transformation, and transduction.
Prerequisites, Microbiology 203 and Zoology 153. Credit, 3.
Mr. Mandel.

215. Antiseptics and Disinfectants.—A critical evaluation of antiseptics and disinfectants, and the procedures used in testing them. Studies of various classes of antiseptics and disinfectants correlate chemical structure to antibacterial activity, mode of action, speed of action, and specificity.
Prerequisites, Microbiology 51 and Chemistry 151. Credit, 3.
The Staff.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

182. Quantitative and Qualitative Microbiology.—The principles and practices of estimating the types, numbers and activities of microorganisms in selected environments.
Two class hours, two 2-hour laboratory periods. Credit, 3.
Prerequisite, Microbiology 51. The Staff.

185. Immunology and Serology.—Consideration of host reactions in prevention and cure of disease; use of biological products in differential microbiology, disease diagnosis and determination of blood groups.
One class hour, one 4-hour laboratory period. Credit, 3.
Prerequisite, Microbiology 52 and permission of instructor. The Staff.

194. Bacterial Physiology.—Growth and activities of microorganisms in respect to environmental factors and genotype. Kinetics of population

growth, enzymatic constitution, intermediary metabolism, and effects of radiation.
Two class hours, one 4-hour laboratory period. Credit, 3.
Prerequisites, Microbiology 31; Chemistry 79 or equivalent, and permission of instructor. Mr. Mandel.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Microbiology)

151, 152. Advanced Microbiology.—The general biological properties of microbes.
Two class hours, two 2-hour laboratory periods. Credit, 3 each semester.
Mr. Mandel.

PHILOSOPHY

Graduate Faculty: C. Shute, Head of Department, L. H. Ehrlich, E. C. Moore, F. E. Oppenheim (Government), J. W. Swanson.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Research and Reading in Philosophy.—Independent graduate research on specific topics in philosophy under the supervision of a faculty member.
Prerequisite, graduate status and permission of the department.
Credit, 2-6.
Maximum credit, 6.
The Staff.

241. Ethical Theory.—Analysis of selected problems of normative and meta-ethics involved in contemporary development of ethical theory.
Prerequisite, permission of instructor.. Credit, 3.

251, 252. Selected Philosophers.—Each semester a leading philosopher will be chosen for intensive reading. Credit, 3.
Prerequisite, permission of instructor. The Staff.

258. Kant.—The *Critique of Pure Reason* will be read in its relation to Kant's philosophy as a whole.
Prerequisite, permission of instructor. Credit, 3.

261, 262. Problems in the History of Ideas.—An inquiry into a distinct major philosophical problem or group of related problems. Credit, 3.
Prerequisite, permission of instructor. The Staff.

266. Philosophy of Education.—An evaluation of various educational theories and practices on the different levels viewed in the light of historical perspective and contemporary thought. Credit, 3.
Prerequisite, permission of instructor. Mr. Ehrlich.

281. Philosophy of Language.—An inquiry into the nature of language, meaning, reference, communication and translation. Topics include the later Wittgenstein, Quine's contextualism, the Whorf-Sapir hypothesis, problems in psycholinguistics. Credit, 3.
Prerequisite, permission of instructor. Mr. Swanson.

285. Metaphysics.—The leading issues in contemporary debate on the nature and limits of metaphysical theory; examination of metaphysical concepts in relation to their use and treatment by other disciplines.
Prerequisite, permission of instructor. Credit, 3.

286. Theory of Knowledge.—A study of perception, subject-object relation, origins of knowledge, concept formation and language, the analytic-synthetic distinction, limits of empiricism and rationalism, relation of epistemology to metaphysics. Credit, 3.
Prerequisite, permission of instructor. MR. SWANSON.

295, 296. Seminar.—Conferences and reports on special studies in philosophy. Credit, 1-3.
THE STAFF.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

Prerequisites. The prerequisites listed are those normally required of undergraduate students. They may be waived by the instructor for graduate students with adequate preparation.

151. History of Philosophy.—Ancient and Medieval.—The development of western thought from its earliest beginnings to the flowering of medieval scholasticism. Emphasis on the contribution of important movements and great thinkers. Credit, 2-3.
MR. BRENTLINGER.

152. History of Philosophy.—Modern.—Continuation of Philosophy 151 from the Renaissance and the rise of modern science to 19th century idealism, positivism and voluntarism. Credit, 2-3.
Three class hours. MR. BRENTLINGER.

153. The Philosophy of Plato.—A study of the later dialogues for their analysis and resolution of major philosophical problems and for their influence on contemporary thought. Given in alternate years.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 151. MR. BRENTLINGER.

155. The Philosophy of Aristotle.—Selections from the works of Aristotle are studied for an understanding of their systematic analysis and theory in the major fields of philosophy. Given in alternate years.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 151. MR. BRENTLINGER.

158. Philosophy in the Age of Enlightenment.—A study of texts by representative thinkers from Descartes and Locke to Kant. The relation of these thinkers to modern science and contemporary thought.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 152. MR. EHRLICH.

161. Contemporary Philosophies.—A survey of the diverse philosophical directions representing the intense activity of contemporary American and European thinking.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 152 or 158. MR. CLAY.

164. Existential Philosophies.—Examination by means of a study of selected original texts, of the main problems peculiar to this movement as a whole and to its main exponents individually.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 151 or 152. Mr. Ehrlich.

167. American Philosophy.—Examination by means of a study of selected original texts by the outstanding American philosophers, of their contribution to Western thought and American civilization.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 151 or 152. Mr. Moore.

168. Oriental Philosophies.—The leading philosophies of Asia with emphasis on India, and the bearing of philosophical differences between East and West on the problem of mutual understanding.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 151 or 152. Mr. Shute.

172. Philosophy of Science.—A critical analysis of the structure of scientific method and the language of science, the respective roles of induction and deduction in science, and the status of theoretical terms.
Three class hours. Credit, 2-3.
Mr. Swanson.

175. Symbolic Logic.—An introduction to such topics as the nature of a decision procedure, completeness of quantification theory, definition of cardinal numbers via sets, object-languages and meta-languages.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 31 or instructor's approval.
Mr. Swanson or Mr. Clay.

176. Mathematical Logic.—Theory of formal systems: equivalence, completeness, incompleteness, decision procedures, formal syntax and semantics, recursive function theory, formal number theory, "reduction" of mathematics to logic.
Three class hours. Credit, 2-3.
Prerequisite, Philosophy 75 or permission of the instructor.
Mr. Swanson or Mr. Clay.

181. Philosophy of Religion.—Readings in contrasting religious philosophies followed by analysis of concepts in understanding religion as coherently related to the other aspects of experience. Credit, 2-3.
Three class hours. Mr. Shute.

182. Aesthetics.—Leading theories of the nature of art, the analysis of aesthetic experience, the distinctive function of art in culture and personality, and the principles of criticism. Credit, 2-3.
Three class hours. Mr. Shute.

184. Political Philosophy.—An attempt to develop critically the moral basis of organized societal living on all levels, with special reference to contemporary problems of sovereignty and nationalism. Credit, 2-3.
Three class hours. Mr. Oppenheim.
Prerequisites, two semester courses in philosophy, or instructor's approval.

195, 196. Seminar.—In each term a study is made of one major philosopher or of one narrowly restricted subject in one special field of philosophical inquiry. Credit, 2-3.
The Staff.
Prerequisite, four semester courses in philosophy and the instructor's approval.

PHYSICAL EDUCATION FOR MEN

COURSES FOR MINOR CREDIT ONLY

In additional to the standard requirements of the courses, graduate students must work on a special project requiring research with a resultant term paper.

153 (I) Physical Education in Elementary and Secondary Schools.—Modern methods of teaching physical education in secondary schools. Objectives, content material, and organization procedures. Credit, 3.
Mr. Cobb.

155. (I) Organization and Administration of Physical Education.—Problems and procedures in physical education, organization of programs, classification of students, equipment, finance, construction and maintenance of gymnasia, swimming pools, and outdoor play areas. Credit, 3.
Mr. Kauffman.

159. (I) Adaptive Physical Education.—A program of developmental activities, games, sports, and rhythms suited to the interests, capacities and limitations of the atypical individual. Credit, 3.
Prerequisite, Physical Education 42. Mr. Garber.

176. (I) Philosophy and Principles of Physical Education.—Contemporary interpretations and critical analysis. Compilation and organization of material in a functional relationship for the foundation of policies and program construction. Credit, 3.
Mr. Garber.

178. (II) Physiology of Exercise.—Application of basic physiological concepts to the program of physical education, emphasis upon the physiological effects and adjustments accruing from participation in physical activity. Credit, 3.
Mr. Ricci.

180. (II) Driver Education Instructor Course.—Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training. Credit, 3.
Mr. Briggs.

PHYSICS

Graduate Faculty: J. D. Trimmer, Head of Department, W. D. Foland, P. R. Jones, M. N. Lewis, P. Rosen, E. A. Soltysik.

Candidates planning to major in Physics should have completed at least (preferably, more than) fifteen semester credit hours in undergraduate physics beyond an introductory course (such as Physics 5, 6, 7) and also six credits of mathematics beyond a full year of college-level calculus.

Requirements for the Master's Degree normally include six credits of work devoted to thesis; by special arrangement, the thesis may be replaced by six credits of class work plus a general written examination.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems. Credit, 1-6.
THE STAFF.

201, 202. Theoretical Physics.—Topics in theoretical physics, with emphasis on classical mechanics (methods of Lagrange, Hamilton, and Jacobi) and on electromagnetic fields in continuous media.
Prerequisites, Physics 52 and 56 and Mathematics 91 and 92.
Credit, 3 each semester.
MR. SOLTYSIK.

211, 212. Quantum Theory.—Elements of wave mechanics, matrix mechanics, and transformation theory. Applications in atomic and nuclear physics. Credit, 3 each semester.
Prerequisites, Physics 201 for 211; Physics 211 for 212. MR. ROSEN.

300. Thesis, Master's Degree. Credit, 6.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

166. Kinetic Theory.—Classical kinetic theory of gases, with an introduction to phenomena in the non-uniform gas. Credit, 3.
Prerequisite, Physics 155. MR. SOLTYSIK.

167. Statistical Mechanics and Information Theory.—A study of the concepts of entropy, information, and order. Credit, 3.
Prerequisite, Physics 161. MR. TRIMMER.

185, 186. Modern Physics.—Lectures and problems on Twentieth-century physics, the first semester devoted principally to atomic aspects, the second to nuclear.
Prerequisites, Physics 152 and six other credits in junior-senior physics.
Credit, 3 each semester.
MR. ROSEN.

188. Solid State Physics.—An introduction to theoretical and experimental physics of the solid state. Credit, 3.
Prerequisite, Physics 185. MR. PATTEN.

191. Gaseous Electronics.—Electrical conduction in gases, interactions of space charge and electromagnetic waves, plasmas. Credit, 3.
Prerequisite, Physics 152 or equivalent. MR. SOLTYSIK.

197, 198. Advanced Experimental Work in Selected Topics.—These courses provide experiments adapted to the needs of the individual student, for training in laboratory techniques and methods of measurement. Two laboratory hours per credit.
Prerequisites, Physics 151, 152 or 155, 156; and Mathematics 30.
Credit, 1-3 each semester.
THE STAFF.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Physics)

151, 152. Electricity and Magnetism.—The basic phenomena and laws of electricity and magnetism. Measurement, with an introduction to circuitry and electronics.

Two class hours; one 2-hour laboratory period. Credit, 3 each semester.
Prerequisites, Physics 4 or 7, Mathematics 30. Mr. Jones.

155, 156. Mechanics.—Development of the fundamental concepts of dynamics with applications to particles and rigid bodies in translation and rotation. Credit, 3 each semester.
Prerequisites, Physics 4 or 7, Mathematics 30. Mr. Foland.

160. Sound and Acoustics.—Vibrations, coupled systems, sound structure, and acoustic properties; principles and applications. Credit, 3.
Prerequisites, Physics 4 or 7, Mathematics 30. Mr. Trimmer.

161. Heat and Thermodynamics.—Heat exchanges and related energy changes in systems of matter. Credit, 3.
Prerequisites, Physics 4 or 7, Mathematics 30. Mr. Crooker.

163. Optics.—An intermediate course in geometical and physical optics.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisites, Physics 4 or 7, Mathematics 29. Miss Lewis.

POULTRY SCIENCE

Graduate Faculty: Thomas W. Fox, Head of Department, Donald L. Anderson, William J. Mellen, J. Robert Smyth, Jr., David K. Wetherbee.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Research problems or critical literature review in avian genetics, physiology or nutrition not related to the candidate's thesis. Credit, 1-6.
The Staff.

204. Avian Genetics.—Lectures covering the classical and physiological genetics of morphological traits of avian species. Particular emphasis is given to melanogenesis and characteristics involving epidermal structures.
Prerequisites, one year's training in biology and Zoology 153 or its equivalent. Credit, 3.
Mr. Smyth.

205. Genetics of Productive Traits.—Lectures and reports on the genetics of meat production and reproduction. Special emphasis is placed on the physiological genetics of fertility and embryogenesis.
Prerequisites, one year's training in biology and Zoology or its equivalent. Credit, 2.
Mr. Smyth.

206. Quantitative Inheritance and Selection.—The principles of population genetics and quantitative inheritance as applied to selection for traits of economic importance in poultry; theoretical and practical considerations of breeding systems.
Prerequisites, Poultry 205, Zoology 153, Statistics 177 or equivalent. Credit, 3.
Mr. Fox.

207. Advanced Poultry Nutrition.—Lectures, reports and discussions of significant research developments and theories in avian nutrition. Prerequisites, Chemistry 151, 152 and 179; and Animal Science 155 or its equivalent. Credit, 3.
Mr. Anderson.

208. Advanced Poultry Physiology.—Lectures and reports on specific problems in avian physiology. Credit, 3.
Prerequisites, Chemistry 179, Zoology 35, or equivalent. Mr. Mellen.

250, 251. Seminar.—Review of Current Literature.
Credit, 1 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

163. Poultry Biology.—The specific biological attributes of the domestic fowl, with emphasis on anatomy and physiology of the digestive, reproductive and endocrine systems and specific physiological responses to environmental influences. Credit, 3.
Mr. Mellen.

173. Poultry Nutrition.—The scientific principles of nutrition, nutritive classification of feedstuffs, formulation and calculation of rations for specific purposes. Credit, 3.
Mr. Anderson.

177. Poultry Breeding.—The improvement of poultry by selection using the principles of heredity. The inheritance of morphological and physiological characters including plumage color, egg production, meat production, hatchability, egg traits and disease resistance. Credit, 3.
Mr. Fox.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Graduate courses in Agronomy, Animal Science, Bacteriology, Chemistry, Home Economics, and Zoology may be approved for Major Credit.

COURSE FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Poultry Science)

135. Advanced Poultry Science.—A critical review of research in any one of the following fields: (a) genetics and physiology, (b) nutrition, (c) marketing, or (d) production management. Three written reports and a comprehensive final examination are required. Designed for teachers of vocational agriculture. Credit, 3.
The Staff.

PSYCHOLOGY

Graduate Faculty: C. C. Neet, Head of Department, M. Budoff, E. Dzendolet, S. Epstein, R. S. Feldman, A. E. Goss, R. H. Harrison, S. L. Kates, D. W. Lewit, J. W. Moore, J. L. Myers, N. A. Myers, W. B. Simon, J. A. Southworth, W. H. Teichner, A. Trehub.

The graduate student majoring in Psychology may orient his program toward either the Doctor of Philosophy degree or the Master's degree. Areas of concentration leading to the Ph.D. are: child, clinical, counseling, engineering, learning, physiological, sensory and social psychology.

Students taking the doctorate must satisfy the general requirements of the Graduate School for the degree. They must also include in their programs of study the following psychology courses: 163 or 211 or 212, 175, 203, 207, 210, 213, 216, 226, 4 units of Seminar (257, 258) and 400. The doctorate program provides practicum courses in each of the applied specialization areas. Institutions and agencies available for such field work include Belchertown State Hospital, Clarke School for the Deaf, Hartford V.A. Mental Hygiene Clinic, Holyoke Mental Health Clinic, Monson State Hospital, Northampton State Hospital, Northampton V.A. Hospital, Rutland Heights V.A. Hospital, Springfield Child Guidance Clinic, Springfield V. A. Mental Hygiene Clinic, University Guidance and Counseling Services, University Nursery School, Worcester V.A. Mental Hygiene Clinic, Worcester Youth Guidance Center, and various industrial concerns in nearby towns.

All students qualifying for the Master of Science degree in Psychology must, in addition to meeting the degree requirements of the Graduate School, take course 175 and either 200 or 300. A final oral examination, given by the problem or thesis committee and the Department, is required. Credits taken to satisfy the requirements for the Master's degree can be applied to the total number of credits required for the doctorate.

Students applying for admission for either the Doctor's or Master's degree program, in addition to meeting the requirements of the Graduate School, should have taken an Introductory course and 21 additional undergraduate credits in Psychology, including a course in laboratory experimental psychology, or the equivalent, and a course in Statistics. In case the student has not taken this number of credits or lacks these courses, he may be allowed to make up the deficiencies in the Undergraduate School of the University. In exceptional cases, students with entrance deficiencies may, at the end of one semester's study, petition the Department to waive remaining undergraduate deficiencies.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Problem in Psychology.—A research project which may be taken in lieu of the master's thesis, or by doctoral students as minor research.
Credit, 4-6.
The Staff.

202. Neural Correlates of Behavior.—The neuroanatomy of sensory-motor systems with emphasis on the major fiber systems and their role in behavior. Credit, 3.
Prerequisites, 6 credits Psychology and 6 credits Zoology or the equivalent.
Mr. Feldman.

203. **Learning I.**—The basic laws of learning, and relevant research techniques. Credit, 3.
Mr. Moore.

204. **Learning II.**—The implications of the basic laws of learning for explaining complex behavior. Credit, 3.
Prerequisite, Psychology 203. Mr. Moore.

207. **Systematic Psychology.**—The general structure of psychological theory, and an historical and comparative consideration of the backgrounds, viewpoints on scientific methodology, research interests and techniques, and the component variables, hypotheses, and laws of structural, Gestalt, functional, and behavioristic movements. Credit, 3.
Mr. Goss.

210. **Emotion and Motivation.**—The nature, determinants, and interrelation ships of emotion and motivation; the techniques involved in investigating these phenomena. Credit, 3.
Mr. Wagner.

211. **Sensory Processes I.**—Auditory and cutaneous senses; the fundamental data with their implications concerning functioning of these systems. Credit, 3.
Prerequisites, Psychology 51, or credits of advanced Psychology and 3 hours of Zoology, or the equivalent. Mr. Dzendolet.

212. **Sensory Processes II.**—Visual, gustatory and olfactory senses; the fundamental data with their implications concerning functioning of these systems. Credit, 3.
Prerequisites, Psychology 51 or 211, or 6 credits of advanced Psychology and 3 hours of Zoology, or the equivalent. Mr. Dzendolet.

213. **Test Construction I.**—Theory and practice of the construction and analysis of tests; correlation procedures; reliability; validity; item analysis; test weights; introduction to factor analysis techniques. Credit, 3.
Prerequisite, Psychology 175, previously or concurrently. Mr. Myers.

214. **Test Construction II.**—Measurement theory; psychophysical methods; construction, analysis, and comparison of various attitude scales. Credit, 3.
Prerequisite, Psychology 213. Mr. Myers.

216. **Advanced Applied Statistics.**—Various experimental designs, the assumptions underlying their use, and the appropriate statistical analyses; orthogonal and randomized designs, trend analysis, non-parametric techniques, and multi-variate analysis. Credit, 3.
Prerequisite, Psychology 175 or its equivalent. Mr. Myers.

221. **Attitudes and Social Perception.**—Cognitive mechanisms in social behavior; experimental and survey techniques in the study of social perception, attitudes, and attitude change.
Two class hours, one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 61 or 161 or equivalent. Mr. Lewit.

226. **Theories of Personality.**—Problems and sources of data relating to the study of personality. An evaluation of the contributions of psychological theories, and an approach to an integrated theory. Credit, 3.
Prerequisite, Psychology 207. Mr. Lewit.

235. Advanced Abnormal Psychology.—Behavior disorders and their relationships to normal behavior, with major emphasis on theories of etiology and symptom formation, and on general problems of therapy.
Credit, 3.
Prerequisite, Psychology 183, or the consent of the instructor. MR. NEET.

242. Learning and Motivation in Children I.—Analysis of experiments on learning and motivation in simple situations with children.
Two class hours, one 2-hour laboratory period. Credit, 3.
Prerequisites, Psychology 203 or 165 or consent of instructor. MR. PRICE.

245. The Psychology of Exceptional Children.—The etiology, diagnosis, and treatment of exceptional children, with special emphasis on intellectual, social, physical and sensory deviations. Credit, 3.
Prerequisites, Psychology 82 or 182, 83 or 235, 65 or 165. Students having only two of these three prerequisites may take the course on consent of the instructor. MR. BUDOFF.

246. Diagnosis and Treatment of Behavior Disorders in Children.—The diagnosis and treatment of psychological maladjustments in infancy and childhood; treatment procedures, resources, and methods used in dealing with behavior and personality problems. Lectures, discussions and case demonstrations. Credit, 3.
Prerequisites, Psychology 182, 183 or 235, 165 or 242, 252 and 253.
MR. BUDOFF.

252. Diagnostic Methods I.—The methods of administration and of the scoring procedures of a variety of diagnostic methods with emphasis on the Rorschach and Thematic Apperception Test. Credit, 3.
Prerequisite, Psychology 182. MR. HARRISON AND MR. SIMON.

253. Diagnostic Methods II.—Basic interpretive procedures of diagnostic devices with emphasis on the Rorschach and Thematic Apperception Test. Credit, 3.
Prerequisite, Psychology 252. MR. EPSTEIN.

255. Psychotherapy I.—Analyses of techniques of individual psychotherapy. The student may elect concurrently a practicum in psychotherapy in which a therapy case, under supervision, will be carried in one of the following facilities: child guidance clinic, student counseling center, mental hospital. Credit, 3.
Prerequisites, Psychology 226, 235, 252, 253 and 254. MR. KATES.

256. Psychotherapy II.—Analyses of group and specialized techniques of psychotherapy. The student will elect concurrently a practicum in which supervised practice in one or more group psychotherapeutic methods will be given. Credit, 3.
Prerequisites, Psychology 226, 235, 252, 253, 254 and 255. MR. KATES.

257, 258. Seminar.—Selected topics of current significance in psychology. Research studies will be analyzed and theoretical advances explored.
Either semester may be elected independently. Both may be taken only with change in topic. Credit, 2 each semester.
Prerequisite, permission of instructor. Maximum credit, 6.
THE STAFF.

265. Counseling Theories and Techniques.—A detailed consideration of current theories and techniques employed in counseling psychology.
Credit, 3.
Prerequisites, Psychology 179, 181, 182, or permission of instructor.
Mr. Southworth.

271. Advanced Industrial Psychology I.—Human factors in work and performance; interrelationships of motivational and perceptual phenomena to the working environment. Credit, 3.
Prerequisite, Psychology 186 or permission of instructor. Mr. Teichner.

272. Advanced Industrial Psychology.—The theory and principles of man-machine-environment systems, with special attention to description, analysis, and synthesis in terms of information theory, servo analogues, psychophysiological effects, and operations research. Operations research will be considered only as it applies to the context of industrial psychology. Credit, 3.
Prerequisites, Psychology 186 and 271. Mr. Teichner.

283, 284. Practicum.—Practice in the application of psychological techniques to the following areas of psychology: child, clinical, counseling, industrial, and social. Either semester may be elected independenty.
Total credit, 3-12.
The Staff, with the Staffs of cooperating institutions and agencies.

295, 296. Research Methodology.—A study and evaluation of research methods and of problems in the major fields of psychology.
Credit, 2 each semester.
The Staff.

300. Thesis, Master's Degree. Credit 8-10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. Social Psychology I.—Development, interrelationships, and functions of attitudes. Emphasis upon religious and political behavior, psychoanalytic and behavioristic theories of prejudice, attitude measurement, propaganda, group persuasion. Survey project.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Lewit.

162. Social Psychology II.—Individual behavior in groups. Interpersonal perception and communictation. Norms, power, leadership, and coalition formation. Individual motivation and group problem-solving.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Lewit.

163. Physiological Psycholoy.—The neurophysiological bases of behavior. The structural and functional relationships among the nervous system, sense organs and drives.
Prerequisites, Psychology 1 or 5, Zoology 35. Mr. Feldman.

166. Adolescent Psychology.—A consideration of the development, and emotional, social and intellectual adjustment of the individual during the adolescent years.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Price.

172. Advanced Experimental Psychology.—The literature, techniques, and apparatus of experimental psychology. Selected projects carried out individually by the members of the class.
One class hour; two 2-hour laboratory periods. Credit, 3.
Prerequisite, Psychology 51 or 52 or 53 or 63. Mr. Dzendolet.

175. Psychological Statistics.—The application of statistical procedures to the analysis of psychological data and to problems of measurement in psychology and related fields.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisites, Psychology 1 or 5, Statistics 177 or Mathematics 62.
Mr. Myers.

181. Psychological Tests.—Survey of tests of intelligence, aptitude, interest, personality and adjustment. Test rationale construction, characteristics, uses of evaluation are emphasized.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Schumer.

182. Psychological Tests, Individual Intelligence Tests.—A study of theories of intelligence and of individual intelligence tests.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Budoff.

185. Industrial Psychology I.—Psychological principles underlying personnel selection and training, communication and decision-making in industry.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Teichner.

186. Industrial Psychology II.—The application of human factors data to the analysis, evaluation, design and use of man-machine systems and equipment. Emphasis is on analysis of human abilities and limitations of speed, accuracy, perception and decision processes.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. Mr. Teichner.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Psychology)

151. Sensation and Perception.—A study of the data, theories and the methods of studying sensation and perception.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 5 or 6. Mr. Dzendolet.

152. Learning and Thinking.—A consideration of the effects and conditions of practice on acquisition, generalization, discrimination, transfer, retention and extinction phenomena.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 5 or 6. Mr. Wagner.

153. Motivation.—The data, theories and the methods of investigating motivation. Topics include primary drives, emotions, frustration and conflict, and learned drives.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 5 or 6. Mr. Moore.

156. Educational Psychology.—Psychological principles and facts fundamental to educational situations. Major areas studied are: learner, learning, adjustment, guidance, teacher, teaching methods, evaluation and measurement.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. MR. SCHUMER.

165. Child Psychology.—The psychological development of the child including maturation and development of behavior, language, emotions, intelligence, social behavior, motivation and personality. Nursery school observation and practice.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. MR. PRICE.

167. Introduction to the Study of Exceptional Children.—Emphasis is on the etiology, diagnosis, characteristics, education and prognosis of deviations in mental, physical and socio-emotional development.
Three class hours. Credit, 3.
Prerequisite, Psychology 165 or consent of the instructor. MR. SCHUMER.

179. Personality.—An introduction to the scientific study of personality. Topics include psychoanalytic and cognitive approaches, the influence of social-cultural conditions, personality types and learning.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. MR. KATES.

183. Abnormal Psychology.—The etiology, symptoms and therapy of behavior abnormalities including the neuroses, psychoses, epilepsies, speech disorders and mental deficiency. Hospital trips and clinics.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. MR. NEET.

187. Psychology of Occupations.—A study of interests, abilities and attitudes related to occupational selection, proficiency, and satisfaction. Psychological techniques fundamental to occupational research are emphasized.
Three class hours. Credit, 3.
Prerequisite, Psychology 81. MR. FIELD.

188. Theories and Techniques of Counseling and Guidance.—The theories, techniques and tests necessary in counseling and guidance. Practice in organizing and evaluating relevant data in the analysis of illustrative cases.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 81 or consent of the instructor. MR. BERENSON.

190. Contemporary Psychologies.—A logical, hitsorical, and systematic analysis of contemporary psychological theories, including structuralism, functionalism, Gestalt and organistic psychologies, psychoanalysis, and behaviorisms.
Three class hours. Credit, 3.
Prerequisite, Psychology 1 or 5. MR. GOSS.

192. Clinical Psychology.—An introduction to the theoretical approach and methods used in understanding and treating the psychologically-disturbed individual.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 183 or consent of the instructor. MR. EPSTEIN.

PUBLIC HEALTH

Graduate Faculty: R. W. Gage, Head of Department.

Students interested in pursuing investigation or obtaining training in the various areas of environmental health will be accepted if previous experience indicates an aptitude for graduate study. In general, the course of study will lead to the degree of Master of Science in Public Health. A cooperative program will be arranged with other departments in the event of special interest or need.

Applicants must satisfy the entrance requirements of the Graduate School. They will usually be best prepared by having completed an undergraduate major in physical or biological science; they may in special circumstances be accepted with other undergraduate major training. Experience in environmental health work may be accepted in lieu of specific undergraduate requirements.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Public Health.—Special investigational or research problems in public health for advanced students. The scope of the work can be varied to meet specific conditions. Credit, 3-6.
The Staff.

201. Public Health Law.—The uses and limitations of law in disease control. Individual work includes studies of court decisions and the preparation of administrative regulations. Credit, 3.
Mr. Wisnieski.

202. Methods of Public Health Education.—The classical health education efforts that have favorably influenced community health. Individual work involves the preparation of pamphlets and exhibits, setting up demonstrations, and arranging short courses for adult groups.
Credit, 3.
Mr. Wisnieski.

203. The Planning of Environmental Health Programs.—Principles of environmental health are translated into community programs planned to meet attainable objectives. Sanitary surveys and rating systems are studied as measuring devices for the practical effect of programs.
Credit, 3.
Mr. Wisnieski.

206. Advanced Epidemiology.—Lectures and discussions on the principles and methods of epidemiological investigation, with laboratory work in assembling and analyzing crude data resulting from field investigations of epidemics. Credit, 3.
Prerequisite, Public Health 188 or equivalent. The Staff.

207. Seminar.—Lectures and reports on current literature and special topics. (One or two credits each semester.) Credit, 1-4.
The Staff.

300. Thesis, Master's Degree.—Independent research leading to the preparation of a thesis that will make an original contribution to public health literature. Results should be suitable for publication. The thesis is

optional for M.S. candidates who have had sufficient training in public health before entering graduate school to profit more from thesis research than from additional courses. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. (I), 162. (II). Environmental Health.—The influence of health measures on community welfare with emphasis on all phases of environmental health.
Three class hours. Credit, 3.
MR. WISNIESKI.

163. (I). Industrial Hygiene and Sanitation.—The practices and principles of industrial processes involved in industrial health and sanitation.
Three class hours. Credit, 3.
MR. PERRIELLO.

164. (II). Microscopy of Water.—Microscopic forms of life exclusive of the bacteria. Counting and control of plankton in potable waters. Elements of limnology.
Three class hours, one 2-hour laboratory period. Credit, 3.
Prerequisite, Microbiology 51 or equivalent. MR. PERRIELLO.

181. (II). Applied Public Health Bacteriology.—Standard methods used in present day applied bacteriology. Areas of study include: soils, dairy products, water and shellfish, and air analysis.
Two class hours, two 2-hour laboratory periods. Credit, 3.
Prerequisite, Microbiology 51 or equivalent. MR. PERRIELLO.

184. (II). Public Health Administration.—The organization, function, and administration of governmental health agencies including: public health laws, regulations, and sanitary codes, their origin and enforcement.
Three class hours. Credit, 3.
MR. PERRIELLO.

186. (II). Public Health Statistics.—Evaluation of environmental health practices using graphical summaries and biostatistical methods.
One class hour, one 4-hour laboratory period. Credit, 2.
Prerequisites, Public Health 161 and 162. MR. WISNIESKI.

188. (II). Epidemiology and Communicable Disease Control.—The general principles of the spread of infections, supported through the study of the communicable diseases, grouped according to their modes of transmission.
Three class hours. Credit, 3.
Admission by permission of instructor. MR. WISNIESKI.

190. (II). Sanitary Bacteriology.—Sample collections and laboratory procedures in stream pollution studies, food poisonings and infections.
One 4-hour and one 2-hour laboratory periods. Credit, 3.
Prerequisite, Applied Public Health Bacteriology 181 or permission of instructor. MR. PERRIELLO.

194. (Summer). Supervised Field Training.—A thirteen week field training program with an official agency under the supervision of the Staff.
Credit, 3-6.

ROMANCE LANGUAGES

Graduate Faculty: S. C. Goding, Head of Department, N. J. Araujo, K. A. Clarke, S. M. Greenfield, R. B. Johnson, I. P. Rothberg, A. P. Stabler.

Requirements for admission to candidacy for the M.A. in French or Spanish in the Department of Romance Languages:

1. Oral and written proficiency in the language of specialization as established by preliminary examination.
2. A reading knowledge of a second modern foreign language.

Course requirements for the M.A.:

1. Romance Language 200 (6 credits) or 300.
2. Terminal examinations as follows:
   a. Comprehensive examination.
   b. For those electing Romance Language 300, oral defense of thesis.

Students are urged to elect Romance Language 201 and Linguistics 197. Students electing Romance Language 201 must possess a basic knowledge of Latin.

THE FOUR-COLLEGE COOPERATIVE Ph.D. IN FRENCH

The University of Massachusetts requirements for admission to the Graduate School require "acceptance by the Department." For the Co-operative Ph.D. in French, acceptance is by all four departments.

In addition to the general requirements at the University of Massachusetts, the following special requirements must be met:

1. Required courses:
   a. One semester of Old French readings.
   b. One semester of French Philology, including an introduction to Vulgar Latin.
   c. One semester of Linguistics.
   d. 400, Ph.D. thesis.
2. A minor consisting of a minimum of 15 credits in an allied field, subject to the approval of the Guidance Committee.
3. A reading knowledge of a second Romance Language and of German or a major language outside the Romance group.
4. Candidates planning on writing a thesis on the Medieval or the Renaissance field must have a reading knowledge of Latin.
5. An oral examination as part of the preliminary comprehensive examination.
6. A comprehensive knowledge of the whole body of French literature.
7. A thorough knowledge of the candidate's special field.
8. A knowledge of Linguistics as well as the ability to read and speak the language.
9. Evidence of a knowledge of the history and culture of France.
10. Evidence of the ability to teach French.
11. Credit for a grade of "C" will be given only if permitted by the institution in which the course is taken.
12. Strongly recommended:
    a. One semester of Advanced Phonetics.
    b. A period of residence in France.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Problem Course.—Directed study in some phase of linguistics or literature. Credit, 3-6.
THE STAFF.

201. Introduction to Philology.—The development of Romance Languages from Latin: phonology, morphology, and syntax. Given as needed. Credit, 3.
THE STAFF.

202. Old French or Old Spanish Readings.—A study of the early monuments of French or Spanish literature. Given as needed. Credit, 3.
THE STAFF.

203, 204. Area Studies in French or Hispanic Civilization.—French and Hispanic cultures as manifested in artistic, intellectual and human achievements. Given as needed. Credit, 3 each semester.
THE STAFF.

205, 206. Advanced Studies in French or Hispanic Literature.—Specialized studies of literary genres or single authors. Given as needed. Credit, 3 each semester.
THE STAFF.

215, 216. Seminar in French or Spanish.—Comprehensive training leading to the now requisite oral mastery of French, to correct grammatical techniques and analyses, to accurate explication de texte, to linguistics and to present-day pedagogical procedures. Credit, 2-3 each semester. Maximum credit, 6.
THE STAFF.

235. History of the French Language. Credit, 3.
THE STAFF.

254. French Philology. Credit, 3.
THE STAFF.

285, 286. Special Studies in 19th Century French Literature. Credit, 3 each semester.
THE STAFF.

300. Thesis, Master's Degree. Maximum credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

Courses in French

151. French Literature of the Eighteenth Century.—The chief writers of the Age of Enlightenment. Credit, 3.
1963-64 and each alternate year.
THE STAFF.

153, 154. French Literature of the Twentieth Century.—The modern French Theatre from Scribe to the present. (One semester.) A study of the Modern French Novel from Proust to the present. (One semester.) Credit, 3 each semester.
MISS CLARKE.

155, 156. French Literature of the Seventeenth Century.—The Classic period with readings from the most representative works.
Credit, 3 each semester.
Mr. Johnson.

157, 158. French Literature of the Nineteenth Century.—A detailed study of the more important authors and movements.
Credit, 3 each semester.
1964-65 and each alternate year. Mr. Goding.

175. Cours De Style.—Syntax and idiom at an advanced level. The student is taught how to express himself clearly and logically in living French. Given as needed. Credit, 2 each semester.
Mr. Smith.

177. The French Renaissance I.—A study of the major writers of the Sixteenth century with appropriate attention to important humanistic and artistic developments. Credit, 2.
The Staff.

178. Advanced French Studies II.—A special study of a French author or literary genre. Subject to be announced at the end of the preceding academic year. Credit, 2.
The Staff.

179. French Civilization.—A study of those elements which lie back of the cultural contribution of France to world civilization, including arts, sciences, school systems, the press, the family, social classes, influences of history and geography. The assigned reading will be drawn from contemporary French literature. Credit, 3.
1963-64 and each alternate year. Mr. Goding.

180. Advanced Language Study.—Methods of teaching review of grammar and pronunciation. Credit, 3.
Mr. Goding.

Courses in Spanish

163, 164. Advanced Spanish Composition and Syntax.—A study of syntax and idioms, and those more advanced and difficult elements which constitute stylistics. Credit, 3 each semester.
1963-64 and each alternate year. Mr. Wexler.

181. Modern Peninsular Spanish Literature.—Major writers of Spain of the late nineteenth and twentieth centuries. Conducted in Spanish. Given in alternate years. Credit, 3.
Three class hours, discussion hour. Mr. Greenfield.

182. Modern Spanish-American Literature.—Hispanic-American letters of the late nineteenth and twentieth centuries. Conducted in Spanish. Given in alternate years. Credit, 3.
Three class hours, discussion hour. Mr. Wexler.

183, 184. The Golden Age.—Readings, reports, lectures, and discussions based primarily on the period of maximum creation, 1556-1600. Attention is also paid to the Renaissance precursors (1474-1556) and to the writers of the Baroque era (1600-1700). Conducted in Spanish.
Credit, 3 each semester.
1963-64 and each alternate year. Mr. Ferrigno.

185, 186. Cervantes.—Reading of Don Quixote; lectures, discussions, collateral readings and reports. Conducted in Spanish. Credit, 3 each semester.
1964-65 and each alternate year. Mr. Wexler.

Linguistics

193. Linguistics.—A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature. Credit, 3.
Three class hours. Miss Duckert.

SOCIOLOGY AND ANTHROPOLOGY

Graduate Faculty: J. H. Korson, Head of Department, E. D. Driver, H. H. Golden, M. M. Gordon, M. E. W. Goss, C. W. King, J. Lopreato, P. I. Rose, L. Sussmann, Thomas O. Wilkinson.

Special Departmental Entrance Requirements:

Candidates for admission who plan to major in Sociology must have completed an undergraduate major, or have taken a minimum of 15 credits in Sociology. An applicant lacking this minimum undergraduate training may be admitted as a special student, and will be expected to make up deficiencies in the undergraduate college of the University. Exceptions to this rule will be made only on petition of the student to the department.

General requirements for the Ph.D. degree are found elsewhere in this catalogue.

Special Ph.D. requirements:

a) a minimum of sixty course credits, of which a minimum of thirty must be earned at the University. A minimum of thirty credits must be earned at the 200 level. The following courses are required for all Ph.D. candidates: Soc. 281, 282, 283, 284, 195, 196, 297, 298, Statistics 177, plus an advanced course in Statistics. Written comprehensive examinations covering Sociological Theory, Research Methodology, and three areas of substantive interest are required of all Ph.D. candidates before the student undertakes the doctoral dissertation.

Special M.A. requirements:

A minimum of 15 credits must be earned at the 200 level. The following are required for all M.A. candidates: Soc. 281, 282, 195, Statistics 177. Students who desire to direct their training toward Correctional Administration will be expected to earn 15 credits at the 200 level.

200. Special Problem.—A special project in Sociology. Credit, 3.
Prerequisite, Sociology 195 or equivalent. The Staff.

212. Social Change.—Analysis of change as a process, especially the factors making for acceptance or rejection of innovations. Intrasocietal sources of change. Consequences of contacts between societies, with emphasis on underdeveloped areas. Credit, 3.
Prerequisites, Sociology 72 or permission of instructor. Mr. King.

214. Criminology.—Criminological theories, past and present with special emphasis on present research trends as they relate to theoretical formulations. Credit, 3.
Prerequisites, Sociology 78 or equivalent, or permission of instructor.
Mr. Driver.

216. Correctional Theory and Practice.—An analysis of contemporary approaches to correction. An evaluation of probation, parole, the socialized court movement, community crime prevention, and related problems. Credit, 3.
Prerequisites, Sociology 78, 195. ———.

217. Juvenile Delinquency.—Theories of causation and treatment of delinquency. Credit, 3.
Prerequisites, Sociology 78 or permission of instructor.

218. Industrial Sociology.—A study of the role, status, and function of the worker in the industrial community; the impact of technological change on the community; analysis of selected occupational functions. Credit, 3.
Prerequisites, Sociology 68 or Economics 79 or permission of instructor.
Mr. Korson.

219. The Sociology of Religion.—The relations of religious ideology and ecclesiastical organization to the total social institutional system. Special attention to the religions of larger civilizations, especially Islam, Buddhism, Medieval Christianity, Gentile Paganism, Protestantism, and Judaism. Credit, 3.
Mr. Manfredi.

229. Sociology of Small Groups.—Survey of sociological theory and research of small groups. Dynamics of leadership patterns, role theories, organization-disorganization theories, decision making, internal process and sociometric structuring. The relevance of small group theory and research to concepts of the inclusive social system. Credit, 3.
Prerequisites, Sociology 82 or equivalent or permission of instructor.
Mr. O'Rourke.

231. Social Gerontology.—Implications of aging for society and the individual. Position of the aged in non-industrialized and industrialized societies. Changing roles of older people in the American family and the community. Credit, 3.
Prerequisites, Sociology 57 or permission of instructor. Mr. King.

232. Sociology of Medicine.—A survey of theory and research concerned with medical care as a social institution. The relation of social factors to illness, and social processes involved in medical education. Credit, 3.
Prerequisites, Sociology 82, 195. Mrs. Goss.

259. Social Stratification.—A consideration of the major contemporary writers and their contribution to this area. Research techniques in the analysis of social class and social mobility are examined. Credit, 3.
Prerequisites, Sociology 59 or equivalent, or permission of instructor.
Mr. Gordon.

262. Demography.—An analysis of the demographic transition from peasant-agriculturalism to urban-industrialism. Emphasis is given to the consequences of this transition for patterns of settlement and for fertility, mortality, and migration. Special studies are made of the demo-

graphic characteristics of non-industrialized nations as factors in their potential development. Credit, 3.
Prerequisites, Sociology 161 or equivalent, or permission of instructor.
Mr. Wilkinson.

271. **Population of India and Pakistan.**—Trends in population growth and its distribution among various social strata. An assessment of the relative influence of fertility, mortality, migration, social organization, and cultural values on growth patterns. Credit, 3.
Prerequisites, Sociology 61, 195. Mr. Driver.

281. **History of Sociological Theory.**—A survey of literature from classical times to the Utilitarians. Credit, 3.
Prerequisites, Sociology 82 or permission of instructor. Mr. Manfredi.

282. **History of Sociological Theory.**—A survey of the literature from Auguste Comte to 1900. Credit, 3.
Prerequisites, Sociology 82 and permission of instructor. Mr. Manfredi.

283. **Contemporary Sociological Theory.**—A consideration of the literature from 1900 to the present. Credit, 3.
Prerequisites, Sociology 281, 282, and permission of instructor.
Mr. Gordon.

284. **Contemporary Sociological Theory.**—A consideration of the literature from 1900 to the present. Credit, 3.
Prerequisites, Sociology 281, 282, 283, and permission of instructor.
Mr. Gordon.

297. **Advanced Research Methods.**—Advanced research design, research models, scaling techniques, electronic data processing techniques.
Credit, 3.
Prerequisites, Sociology 195, 196, and permission of the instructor.
Miss Sussmann.

298. **Advanced Research Methods.**—A research project designed and carried out by the student under the supervision of a member of the staff. Sociology 297 and 298 must be completed with a grade of "B" or higher before a student is permitted to undertake a dissertation.
Credit, 3.
Prerequisites, Sociology 297, and permission of the instructor. The Staff.

299. **Internship.**—Supervised training and practice in the administration of a state correctional institution or organization. Students chosen for this training will serve with one of the following: Women's Reformatory (Framingham), Men's Reformatory (Concord), The Bureau of Classification (Department of Correction), Youth Service Board (Department of Education), The United Prison Association (Boston) or other agencies approved by the department. A minimum of three months (40-hour weeks) is required and will normally take place the summer following completion of the major part of the student's course work.
Credit, 3.
Prerequisites, Sociology 192, 214, and 217. The Staff.

300. **Thesis, Master's Degree.** Credit, 6.

400. **Thesis, Ph.D. Degree.** Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151. Urban Sociology.—A comparative study of modern social conditions, and methods of adjustment, with special reference to city environment. Characteristics of the population, urban ecology, and problems of adjustment in the fields of housing, health, education, and recreation. Credit, 3.
MR. MANFREDI.

152. Rural Sociology.—Rural society from the standpoint of its population, institutions, standards of living, and their relation to urban society. Credit, 3.

156. Race Relations.—The social, economic, and political aspects of racial problems in the U. S., with particular reference to the Negro and major ethnic groups. Problems resulting from contact of races in Asia, Africa, and South America. Credit, 3.
MR. GORDON.

157. The Family.—The development of the customs of courtship and marriage of the contemporary American family; basic causes of changes and trends of the family including mate selection, marriage laws, marital prediction, husband-wife relations, and the role of the child. Credit, 3.
MR. KING.

161. Population Problems.—The physical and social factors which influence population change through births, deaths, and migration, with special emphasis on the population problems of underdeveloped areas in the world today. Credit, 3.
MR. WILKINSON.

170. Social Structure of India.—The origins, distribution, and cultural traits of the major groups in India. Special attention given to marriage, family, and caste patterns, and their relation to and positions in the economic and political system. Credit, 3.
MR. DRIVER.

175. Social Problems.—The incidence, distribution, and interrelations among the major types of social tensions in human societies. Research projects and field trips required. Credit, 3.
MR. DRIVER.

192. Introduction to Social Welfare.—Contemporary problems of social concern; methods of caring for adult and child dependents and defectives; public and private agency administration and techniques; and an examination of federal, state, and local community programs. Credit, 3.

195, 196. Seminar.—The methods of research employed by social scientists. Research projects must be approved in advance by the instructor. Credit, 3.
Prerequisite, permission of instructor. MR. PARK.

Statistics

177. Elementary Statistics.—An introduction to concepts and methods used in describing the reliability and significance of statistics. Credit, 3.
MR. PARK.

Anthropology

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

236. Individual and Society.—A cross-cultural consideration of the relationship between the individual and his society with attention to theories, methods and empirical findings as reported in the literature of the behavioral sciences. Credit, 3.
Prerequisites, Anthropology 163, 164 or permission of instructor.
Mr. Lopreato.

237. Theory in Social Anthropology.—Theoretical problems which have had a lasting place in anthropological thought; social structure, cultural dynamics and stability, and the transmission of culture as discussed by leading writers. Credit, 3.
Prerequisites, Anthropology 163, 164 or permission of instructor.
Mr. Fortier.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

163. Social Anthropology.—An introduction to the principles of physical and cultural anthropology, including cross-cultural analyses of family systems, religion, economics, linguistics and art. Credit, 3.
Prerequisite, permission of instructor. Mr. Fortier and Mr. Fraser.

164. Problems in Anthropology.—The evolution of culture, language, religion, social organization and law. Credit, 3.
Prerequisite, permission of instructor. Mr. Fortier.

165. Ethnographic Survey of Non-Literate Peoples.—The current cultures of representative societies from Africa, Oceania, North America, South America, and Asia viewed in relation to historical and environmental influences. Credit, 3.
Prerequisite, permission of instructor. Mr. Fraser.

167. Ethnology of Africa.—A limited consideration of the history, physical types, social organization and culture of Africa south of the Sahara with special consideration of several diverse cultures. Credit, 3.
Prerequisite, permission of instructor. Mr. Fraser.

Interdepartmental Courses

Social Science 160. Africa, South of the Sahara.—An introductory study of recent political, economic, and social developments in the principal countries in Africa, south of the Sahara. Credit, 3.
Prerequisites, at least two courses in one or more of the following fields: Government, Economics, Sociology. Miss Carter.

Social Science 169. India and Southeast Asia.—An introductory study of recent political, economic, and social developments in India and the countries of South and Southeast Asia. Credit, 3.
Prerequisites, at least two semester courses in one or more of the following fields: Government, Economics, Sociology. Mr. Driver.

SPEECH

Graduate Faculty: A. E. Niedeck, Head of Department, I. E. Hegarty.

A two year graduate program for preparation as a teacher of the deaf, leading to a Master of Arts degree, may combine graduate study in Speech Pathology and Audiology and the teacher training program at Clarke School for the Deaf, Northampton, Massachusetts. Federal grants from the U. S. Office of Education are available for qualified candidates interested in this program.

1. General Admission Requirements:
   a. Basic requirements for admission to the Graduate School.
   b. Students presenting at least twelve hours in Speech (i.e., Speech 81, 83, 85, 82 or their equivalents) and nine hours in Psychology or Education may arrange a graduate program leading to the Advanced Certificate in Speech in the American Speech and Hearing Association.
   c. Students presenting at least three hours in Speech (i.e., Speech 81, 85 or 82) and a major in Psychology may arrange a graduate program leading to the Basic Certificate in Speech of the American Speech and Hearing Association.
   d. Students presenting at least three hours in Speech (i.e., Speech 81, 85, or 82) and a major in Education may arrange a graduate program leading to the Basic Certificate in the American Speech and Hearing Association and the requirements of the Massachusetts Department of Education for teachers of the speech and hearing handicapped.
2. Basic Requirements:
   a. Thirty hours of graduate courses, including twenty-four hours in the major field. Psychology or Education may be chosen as the minor field.
   b. A thesis will be required.
   c. There will be no foreign language required.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Clinical Practicum.—Supervised clinical practice with children and adults with various speech and hearing disorders; group and individual therapy techniques. Credit, 3-6 each semester.
Prerequisites, Speech 81, 83, 85 or equivalents. The Staff.

201. Voice Problems.—A study of voice disorders, organic and functional; symptoms and principles and techniques of therapy and diagnosis. Credit, 3.
Prerequisites, Speech 83, 85 or equivalents. Miss Hegarty.

203. Experimental Phonetics.—Study and analysis of phonetic elements of language, emphasis on laboratory instrumentation and research techniques. Credit, 3.
Prerequisites, Speech 81, 83, or equivalents. The Staff.

300. Master's Thesis. Credit, 3-6.
Miss Hegarty.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

181. Phonetics.—A scientific study of the sounds of English; descriptive analysis of individual vowels and consonants. Study of the International Phonetic Alphabet; training in auditory discrimination.
Three class hours. Credit, 3.
Miss Hanifan, Miss Labelle.

182. Introduction to Clinical Practice.—Training in basic diagnostic and therapeutic techniques for various speech handicaps; emphasis on articulation defects, delayed speech and stuttering, supervised practice required.
Prerequisites, Speech 81, 85. Credit, 3.
Two class hours, one 2-hour laboratory period.
Miss Hanifan, Miss Labelle.

183. Anatomy and Physiology of the Speech and Hearing Mechanism.—A study of the anatomy and physiology of the speech and hearing mechanism; consideration of phonation, resonance, articulation and audition.
Three class hours. Credit, 3.
Prerequisite, Speech 85. Miss Hegarty.

184. Audiology.—A study of the symptoms and causes of hearing loss; special attention to diagnostic test procedures. Supervised practice in audiometric testing. Observation; field trips.
Three class hours. Credit, 3.
Prerequisite, Speech 85. Miss Hegarty.

185. Introduction to Speech Pathology.—A study of the causes, functional and organic, of speech problems among children and adults; principles of diagnosis and therapy. Observation; field trips.
Three class hours. Credit, 3.
Prerequisite, Psychology 26. Miss Hegarty.

186. Rehabilitation of the Acoustically Handicapped.—Training in the techniques of speech therapy, auditory training, and speech reading for children and adults with hearing impairments. Laboratory practice under supervision.
Two class hours, one two-hour laboratory period. Credit, 3.
Prerequisite, Speech 84. Miss Hanifan.

188. Advanced Clinical Practice.—Advanced training in clinical practice under supervision; special consideration of organic speech disorders. Opportunity for supervised clinical practice at Lemuel Shattuck Hospital.
Prerequisite, Speech 82. Credit, 3.
Two class hours, one 2-hour laboratory period. Miss Hegarty.

196. Seminar in Speech Pathology.—Individual student reports on selected topics in the field of Speech Pathology.
Three class hours. Credit, 3.
Prerequisite, Speech 85. Miss Hegarty.

STATISTICS

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

177. Elementary Experimental Statistics. See pages 31, 137.
179. Elementary Economics Statistics. See page 31.
180. Advanced Statistical Method. See page 31.
Mathematics 163. Probability. See page 107.
Mathematics 164. Mathematical Statistics. See page 107.
Psychology 175. Psychological Statistics. See page 127.

COURSE OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Psychology 216. Advanced Applied Statistics. See page 124.

VETERINARY SCIENCE

COURSE FOR MINOR CREDIT ONLY

172. General Veterinary Pathology. Credit, 3.
Mr. Smith.

WILDLIFE AND FISHERIES BIOLOGY

Frederick Greeley and Earl E. Deubler, Jr., Major Advisors.
William G. Sheldon, Leader, Massachusetts Cooperative Wildlife Research Unit.

Most applicants for admission to graduate work in wildlife and fisheries biology must have completed a bachelor's degree in the biological sciences. Occasional exceptions are made for applicants from other fields, provided they make up their deficiencies in basic biology as part of their graduate program.

Graduate students pursue courses of study directed toward acquiring proficiency in independent research in either the wildlife or fisheries field. Work in fisheries involves both fresh water and marine environments. Courses may be taken in the department and in related fields. A research thesis is normally required. Fisheries research is conducted in close cooperation with the Massachusetts Division of Fisheries and Game. Wildlife research is usually conducted in the Massachusetts Cooperative Wildlife Research Unit under the supervision of the unit leader. The unit receives support from the Massachusetts Division of Fisheries and Game, the United States Fish and Wildlife Service and the Wildlife Management Institute.

Undergraduate students who receive their bachelor's degree in fisheries or wildlife at the University of Massachusetts are urged to pursue graduate work at other Universities, many of which also have Cooperative Research Units.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Wildlife or Fisheries Biology.
Credit, 3 per semester.
Maximum credit, 6.
THE STAFF.

201, 202. Seminar in Wildlife and Fisheries Biology.—Review and discussion of the literature in Wildlife and Fisheries Biology, including such subjects as population dynamics and manipulation, law and administration, Afro-Eurasian problems, influence of land-use, Arctic environments, and others. Credit, 3 each semester.
Maximum credit, 6.
THE STAFF.

300. Thesis, Master's Degree. Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161. Principles of Wildlife Biology.—Fundamental ecology and principles of Wildlife Management, with emphasis on population characteristics and responses. Credit, 3.
MR. GREELEY.

162. Techniques of Wildlife Biology.—Methods of collecting and interpreting data in Wildlife Management, with emphasis on field and laboratory experience in census methods and criteria for determining sex, age and other characteristics of wild birds and mammals. Credit, 3.
MR. GREELEY.

163. Management of Wetland Wildlife.—Life histories, identification and habitat requirements of waterfowl and marshland furbearing animals; management of wetland habitats.
1962-63 and each alternate year. Credit, 3.
MR. GREELEY.

164. Management of Upland Wildlife.—Life histories, identification and habitat requirements of upland game birds, game mammals, and furbearers; management of upland habitats.
1963-64 and each alternate year. Credit, 3.
MR. GREELEY.

165. Techniques of Fisheries Biology.—Principles and techniques of fishery management, stressing population and growth dynamics, and field procedures. Credit, 3.
MR. DEUBLER.

166. Physiology of Fishes.—Study of physiological functions relative to the environment of fishes. The adaptations of local species to particular habitats will be studied in the field and laboratory. Credit, 3.
1963-64 and each alternate year. MR. DEUBLER.

168. Survey of Fisheries Resources.—Review of the sport and commercial fisheries of the United States, with special emphasis on crustaceans, molluscs and fishes. Coastal field trips by arrangement. Credit, 3.
MR. DEUBLER.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT MAY BE GIVEN

When appropriate for the student's program of instruction and research, and with the consent of the student's advisor, major credit will be given for certain courses in the following subject-matter areas: Agricultural and Food Economics, Botany, Education, Entomology and Plant Pathology, Forestry, Statistics, and Zoology.

ZOOLOGY

Graduate Faculty: D. Fairbairn, Head of Department, E. Anderson, L. M. Bartlett, W. R. Harvey, B. M. Honigberg, J. G. Moner, W. B. Nutting, H. Rauch, J. L. Roberts, H. D. Rollason, J. G. Snedecor, D. P. Snyder, P. A. Swenson.

In order to be considered for graduate standing students must offer at least twenty credits in biology.

A written proficiency examination will be given to all first year graduate students (except specials) on a day prior to the student's first registration.

The Master of Arts degree will be awarded to graduate students in Zoology who successfully complete the basic requirements stated on page 19 and the following specific requirements: If a ten credit thesis is offered, the student must pass an oral examination; if no thesis is offered, fifteen credits must be in the "200" category (Courses Open to Graduate Students Only) and the student must pass a written examination. Six credits of Zoology 200 will be required of all non-thesis Masters' candidates in Zoology. This to be used either for a research problem or for a library research problem.

All Ph.D. candidates must have the following courses or their equivalent as soon as possible after admission: Zoology 150, 153, 171, 172, 181, 183, and 184. The student should select at least one course of an advanced nature (preferably a "200-series" course) in each of the following areas to insure that he will have advanced work in each phase of Zoology.

A. Morphology
B. Physiology
C. Genetics
D. Invertebrate Zoology
E. Vertebrate Zoology

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems. Credit, 1-6.
The Staff.

202. Advanced Invertebrate Zoology.—Morphology, habits and life cycles of certain invertebrates.
Laboratory discussion periods, field trips. Credit, 3.
Prerequisite, Zoology 25, 170, 174 or equivalent. Mr. Nutting.

204. Helminthology.—Morphology, classification and life histories of the principal groups of parasitic helminths.
Laboratory seminar reports. Credit, 3.
Prerequisite, Zoology 169 or equivalent.

210. Electron Microscopy.—Lectures and laboratory on the electron microscope and methods of specimen preparation. Credit, 3.
Prerequisite, permission of instructor. MR. ANDERSON.

220. Experimental Embryology.—Physiology, biochemistry, and ultrastructure of development with reference to gametogenesis, fertilization, cleavage, induction, differentiation, regeneration, and metamorphosis. Emphasis on control mechanisms. Credit, 3.
Prerequisites, Zoology 172, Chemistry 33 or equivalents. MR. HARVEY.

240. Advanced Cellular and Comparative Physiology.—Detailed study of one or more of the following topics: radiation biology, physiological adaptations, and submicroscopic structure of protoplasm. Credit, 2-4.
Prerequisites, Zoology 183 and 184.
MR. SWENSON, MR. ROBERTS AND MR. MONER.

245. Advanced Vertebrate Physiology.—Experience in small animal surgery and in making standard experimental preparations; suitable techniques for recording results; special emphasis on proper interpretation of data.
One class hour; one 4-hour laboratory period. Credit, 3.
Prerequisites, Zoology 35 and 171. MR. SNEDECOR.

248. Physiological Genetics.—The nature of the gene and its action in the developmental and physiological processes of the organism. Credit, 3.
Prerequisites, Zoology 153 or equivalent, and permission of instructor.
MR. RAUCH.

255. Departmental Seminar. Credit, 1 each semester. Maximum credit, 4.
THE STAFF.

265. Animal Behavior.—The evolution and significance of behavior patterns of invertebrates and lower vertebrates. Credit, 3.
Two 2-hour lecture-discussion periods. MR. BARTLETT AND MR. NUTTING.
Prerequisites, Zoology 153, 180 or 181 or 182, and 169 or 170.

273. General Cytology.—The morphological features of cells in relation to their function. Lectures, seminar reports and individual laboratory work. Credit, 3.
Prerequisite, Zoology 150. MR. ROLLASON.

275. Fine Structure and Function of Cells.—Lectures, discussions, readings and reports on fine structure of cells and dynamic morphology. Credit, 3.
Prerequisites, General Physiology and Cytology. MR. ANDERSON.

286. Principles of Systematic Zoology.—The objectives, approaches and results of research in systematic zoology, including procedures applicable to binomial naming with particular emphasis on analytical procedures for determining lower taxonomic groups. Credit, 2.
Prerequisites, Zoology 153, 171, 172, and one of the following: 170, 180, 181, or 182. THE STAFF.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

150. Histology.—Study of the cell, tissues, and microscopic anatomy with emphasis on the mammal. Credit, 3.
Two class hours, one 3-hour laboratory period. Mr. Rollason.

153. Principles of Genetics.—Lectures and laboratory experiments concerning the laws governings the transmission of hereditary factors in plants and animals, expression and action of genes, population genetics, and the relationship of genetics to other biological sciences.
Two class hours, one 3-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Rauch.

164. Biology of Protozoa.—Morphology and physiology of Protozoa, with emphasis on the contributions made to the basic problems of biology through the study of these organisms.
One class hour, one 2-hour and one 3-hour laboratory period. Credit, 3.
Prerequisites, Zoology 1 and permission of instructor. Mr. Honigberg.

169. Animal Parasitology.—Morphology, life cycles, and physiology of primarily protozoan and helminth parasites, with emphasis on broad aspects of parasitism.
Two class hours, two 2-hour laboratory periods. Credit, 4.
Prerequisites, Zoology 1 and one year of college chemistry.
Mr. Honigberg.

170. Invertebrate Zoology.—Survey of the phyla of invertebrate animals from evolutionary and phylogenetic aspects.
Lectures, discussion periods, laboratory. Credit, 3.
Prerequisite, Zoology 1. Mr. Nutting.

171. Comparative Vertebrate Anatomy.—A thorough study of the anatomy of the vertebrates, with emphasis on the evolution, special modifications, and functional interrelationships of each of the organ systems.
Two class hours, two 3-hour laboratory periods. Credit, 4.
Prerequisite, Zoology 1. Mr. Bartlett and Mr. Snyder.

172. Embryology.—Lectures emphasize physiological and biochemical aspects of development. Laboratories cover descriptive and comparative phases of ontogeny, especially of amphibian, bird, and mammal.
Two class hours, two 3-hour laboratory periods. Credit, 4.
Prerequisite, Zoology 171. Mr. Harvey.

174. Limnology.—Study of inland waters, including geological, physical, chemical and biological aspects.
Lectures, laboratory, field trips. Credit, 4.
Prerequisites, Botany 1, Zoology 1, Chemistry 1 and 2, and permission of instructor. Mr. Andrews.

178. **Population Genetics.**—Introduction to the principles of population genetics; the population approach to the origin of species and the study of human genetics. Enrollment limited to 10.
One lecture, one 2-hour discussion period. Credit, 2.
Prerequisite, Zoology 153 or equivalent and permission of instructor.
Mr. Rauch.

180. **Ornithology.**—Avian biology with emphasis on structural and functional adaptations, and particularly behavioral patterns. Laboratory includes field trips.
Two class hours, one 2-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Bartlett.

181. **Vertebrate Zoology.**—Classification and ecology, with particular emphasis on the fishes.
One class hour, two 2-hour laboratory periods. Credit, 3.
Prerequisite, Zoology 1. Mr. Andrews.

182. **Mammalogy.**—Evolution, distribution, classification, and natural history of mammals; laboratory work will emphasize the local fauna. Two or three field trips required. Laboratory will include field trips, preparation of study material, and identification of local fauna. Enrollment limited to 15.
Two class hours, one 3-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1 and permission of instructor. Mr. Snyder.

183. **General and Cellular Physiology.**—Modern trends in physiology with emphasis on the chemical and physical properties of cells, including protoplasmic organization, cellular metabolism, permeability, bioelectric phenomena, muscle contraction, and radiation biology.
Three class hours, one 3-hour laboratory period. Credit, 4.
Prerequisites, one year biology and organic chemistry. Mr. Swenson.

184. **Comparative Physiology.**—Physiological principles involved in adaptations of animals to their environment; emphasis in the laboratory on experimental methods used to study adaptive mechanisms.
Three class hours, one 3-hour laboratory period. Credit, 4.
Prerequisites, Zoology 1, 35 or 183. Mr. Roberts.

186. **Fishery Biology.**—The regulation of fresh-water fisheries; the physical and biological conditions of the environment and their influence on fish populations. Credit, 3.
Prerequisite, Zoology 181 or permission of instructor. Mr. Andrews.

187. **Endocrinology.**—The importance of the endocrines in their control over normal functions (growth, metabolism, reproduction, etc.) in a variety of animals. Credit, 3.
Two class hours, one 3-hour laboratory period. Mr. Snedecor.

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